MAY 3 1933

The OIL AND GAS JOURNAL

PRODUCING

REFINING

NATURAL GASOLINE

PIPELINE

MARKETING

IS IT TIMKEN BEARING EQUIPPED?

YOUR MOST IMPORTANT QUESTION WHEN BUYING ANY TYPE OF OIL FIELD MACHINERY

It will pay you to study the bearing equipment closely when buying drilling machines, rotaries, pumps, hoists, engines or any other type of oil field machinery.

It will make all the difference between dependable operation and long life on the one hand, and production delays and rapid depreciation on the other.

If you find a full complement of Timken Tapered Roller Bearings guarding the friction and hard service points, you can look forward with confidence to receiving many extra years of trouble-free service, with maintenance costs cut to the bone. Buy Timken-equipped, the overwhelming choice throughout the oil fields.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

NOT ONLY MORE WEIGHT

but a *conditioning* material

FOR ROTARY DRILLING FLUIDS

COLOX not only makes a heavier mud weight (makes pumpable muds up to 18 lbs. per gallon) but it conditions the mud to control troubles you run into when drilling any well. Colox is very fluid (thin) even in the heaviest mixes, will not ball up and forms a thin strong filter cake on the walls of the hole.

THIS BOOKLET GIVES HELPFUL INFORMATION ON DRILLING FLUIDS

We will be glad to send it to you

manufactured under exclusive license by

GEO. S. MEPHAM & CO., 2001 Lynch Avenue, East St. Louis, Ill.
for Mid-Continent and Gulf Coast areas and

C. K. WILLIAMS & CO. of Calif. Ltd., Shellmound Park, Emeryville, Calif.
for Pacific Coast area

Distributed in the Mid-Continent and Gulf Coast areas by The Republic Supply Co.

THE OIL AND GAS JOURNAL

Volume 32
Number 1

May 25, 1933

Subscription rates: 1 year, $6; (Canada and foreign, $7); 6 months, $3; 3 months, $2; current copies, 15 cents; (extra copies of special numbers, 50 cents)

SPECIAL ARTICLES

No Hope Held for any Effective Curtailment in Texas Under the Present Political Setup ---- 5
By ANDREW M. ROWLEY
Exchange of Views Made A.P.I. Meeting Profitable--- 6
Overtaxation Big Cause of Industry's Ills---------- 6
Dictatorship Bill Sidetracked for Industry Recovery Bill ---- 7
By CHARLES E. KERN
Trend Toward Higher Octane Number Motor Fuel---- 8
By W. T. ZIEGENHAIN
Car Manufacturers Could Help Solve Vapor Lock Problem ---- 8
By DR. O. C. BRIDGEMAN
Expanding Outlets for Heavier Products Attract Marketers ---- 9
By C. O. WILLSON
Indiana Standard Explains New Policies in Marketing-- 10
By ALLAN JACKSON
Oil Brightens Outlook of Conroe ---- 11
By THOMAS F. SMILEY
Economic Committee Estimates Offer Pattern for Operations ---- 12
Well Spacing, Proration and Production Practice Before A.P.I. ---- 13
By L. G. E. BIGNELL
Application of Subsurface Pressures and Temperatures in East Texas ---- 14
By C. E. REISTLE, Jr., and E. P. HAYES
World's Fair Will Have Complete Oil Exhibit ---- 18
Warning From Washington (Editorial) ---- 20
Gulf Port Shipments ---- 32
National Oil Scouts' New Officers ---- 44
Factors in Reforming Naphtha to Improve Octane Number ---- 48
By E. J. LEROI and H. W. FERGUSON
Laboratory Control of Making Paraffin Distillate Simplifies Dewaxing ---- 49
By L. L. DAVIS and D. S. CAMPBELL
Use of Trichlorethylene in Centrifugal Dewaxing---- 52
By CARL F. PESTER
Design and Operation of Small Experimental Cracking Unit ---- 53
By W. W. GARY and J. T. WARD
Range Oil Burners Offer Large Market for Oil ---- 54
By L. F. SPEARE and C. B. COOLEY
Jet Pump Principles Applied to Production Problems-- 57
By M. P. O'BRIEN and J. E. GOSLINE
Permeability of Sand Influences Capacity and Drainage 58
By T. V. MOORE, R. J. SCHILTHUIS and WILLIAM HURST
Corrosion of Oil Well Tubing ---- 61
By WALTER F. ROGERS
Hints of Practical Value ---- 74
By L. G. E. BIGNELL
Field Problems From Readers ---- 85
Edited by THOMAS F. SMILEY
New Process Obtains Large Yields of Lub Stock and Asphalt ---- 94
By C. O. WILLSON

FIELD OPERATIONS

Late Fields ---- 32
West and North Texas ---- 42
East Texas ---- 42
By I. E. BREDBERG
Oklahoma ---- 65
By W. A. SPINNEY
Kansas ---- 67
By W. A. SPINNEY
North Louisiana-Arkansas, Mississippi ---- 68
By D. H. BANCROFT
Southwest Texas ---- 69
By B. D. STEVENSON
Gulf Coast ---- 70
By NEIL WILLIAMS
California ---- 71
By L. P. STOCKMAN
Central West ---- 73
Eastern Fields ---- 73
By GEORGE A. WHITNEY
Michigan ---- 73
Rocky Mountain Area ---- 75
By TOLBERT R. INGRAM
Canada ---- 76
By VICTOR LAURISTON

REFINING AND MARKETING

Bright Stocks and Wax in Oklahoma Refinery Market, With Kerosene Weak ---- 22
By C. O. WILLSON
A.P.I. Refinery Report ---- 23
Refinery and Crude Prices ---- 24-25
Tank Wagon Markets ---- 26
Natural Gasoline Manufacture ---- 27
New York Market ---- 28
By A. E. MOCKLER
Chicago Market ---- 29
By R. C. CONINE
News for Petroleum Refiners ---- 33
Technical Questions Answered ---- 86
By C. K. FRANCIS, Ph.D.

GENERAL DEPARTMENTS

Natural Gas Developments ---- 89
Personal Paragraphs ---- 90
New and Improved Equipment ---- 92-93
Classified Advertising ---- 95
Index to Advertisers ---- 96

Refinery Section Starts on Page 22

Branch Editorial Offices

CHATHAM, ONT.	CHICAGO, ILL.	DENVER, COLO.	FT. WORTH, TEX.	HOUSTON, TEX.	LOS ANGELES	OIL CITY, PA.
Victor Lauriston	Robert C. Conine	Tolbert R. Ingram	L. E. Bredberg	Neil Williams	L. P. Stockman	Leon H. Walter
35 Stanley Ave.	6 N. Michigan Ave.	State Office Bldg.	Petroleum Bldg.	Sec. Nat. Bank Bldg.	Union Oil Bldg.	Oil City Derrick

MUSKEGON, MICH.	SAN ANTONIO, TEX.	TOLEDO, OHIO	SHREVEPORT, LA.	NEW YORK	WASHINGTON, D. C.
Paul A. Elliott	B. D. Stevenson	George A. Whitney	D. H. Bancroft	A. E. Mockler	Charles E. Kern
Chronicle Bldg.	802 Milam Bldg.	Box 98, Main P. O.	540 Ricou Brewster Bldg.	415 Lexington Ave.	2632 Woodley Place, N.W.

Branch Advertising Offices

NEW YORK	CLEVELAND, OHIO	CHICAGO	LOS ANGELES	HOUSTON, TEX.
C. L. Cain	Howard Markt	C. R. Farmer	J. H. Tinkham	Neil Williams
415 Lexington Ave.	802 Leader Bldg.	6 N. Michigan Ave., Rm. 1416	2941 Raymond Ave.	1116 Sec. Nat. Bank Bldg.

Copyright, 1933, by The Petroleum Publishing Co.

PROVEN IN SERVICE

"Used Where Performance Counts"

Records established in oil fields throughout the world, prove that Grant Oil Tools provide greatest efficiency, maximum safety and longest service at lowest operating cost.

GRANT

Grant Straight Reamer. Trues up the hole to same size as bit.
Patent No. 1813160

Famous Grant "Type C", 3-Cutter Rotary Underreamer. Standard of the World.

A TIGHT JOINT IN 30 SECONDS

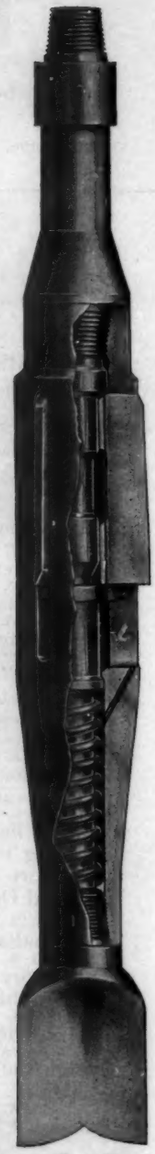
"Lightning Fast" locking device helps complete cementing jobs in fast time and with least danger in emergencies.

Every Grant Cement Head tested to 2000 pounds pressure.

Available in Ball and Screw types, with or without Plug Holder.

GRANT CEMENT HEAD

Grant Wall Scraper. (Not an Underreamer.)



Grant Shale Underreamer for soft formations, showing cutters expanded.

Write for Latest Literature and Name of Nearest Distributor

GRANT OIL TOOL COMPANY

2042 EAST VERNON AVE., LOS ANGELES, CALIF.

No Hope Held for Any Effective Curtailment in Texas Under the Present Political Set-up

By ANDREW M. ROWLEY

DECLINING bottom hole pressures in the East Texas Field, rapidly hastening the time when that area will be forced on a mechanical production basis, together with the universal belief some legislation will be enacted soon at Washington to control production, are the reasons for the feeling of optimism which is quite widespread despite the low prices of both crude and refined oils.

Many oil men, normally opposed to any type of legislation for the petroleum industry, are convinced the only possible hope for curtailment of production in East Texas to anywhere near reasonable market demands lies in Federal action in the matter. A majority apparently believe there is no need of a dictator such as proposed under the Marland bill and that the Industrial Recovery Bill, now under consideration by Congress, contains ample provisions for the working out of problems of the oil industry.

Close students of conditions in East Texas blame politics for the chaotic condition existing in that area. These men say there is absolutely no hope of obtaining any relief whatever from the Texas Railroad Commission or the attorney general of Texas. They point to the fact a gubernatorial election will be held in Texas within the next two years and that politicians are influenced more by that coming election than any factor concerning the welfare of the petroleum industry, despite the fact the oil business is the most important industry in Texas from a revenue standpoint.

With no hope of relief from Texas state authorities, the matter of how much East Texas can produce on a mechanical basis increases in importance. Investigations made by engineers qualified by experience in the field to make an estimate, indicate East Texas may produce 1,000,000 bbls. daily by mechanical means for a long period of time—probably for at least one year. Naturally such a figure is merely an estimate.

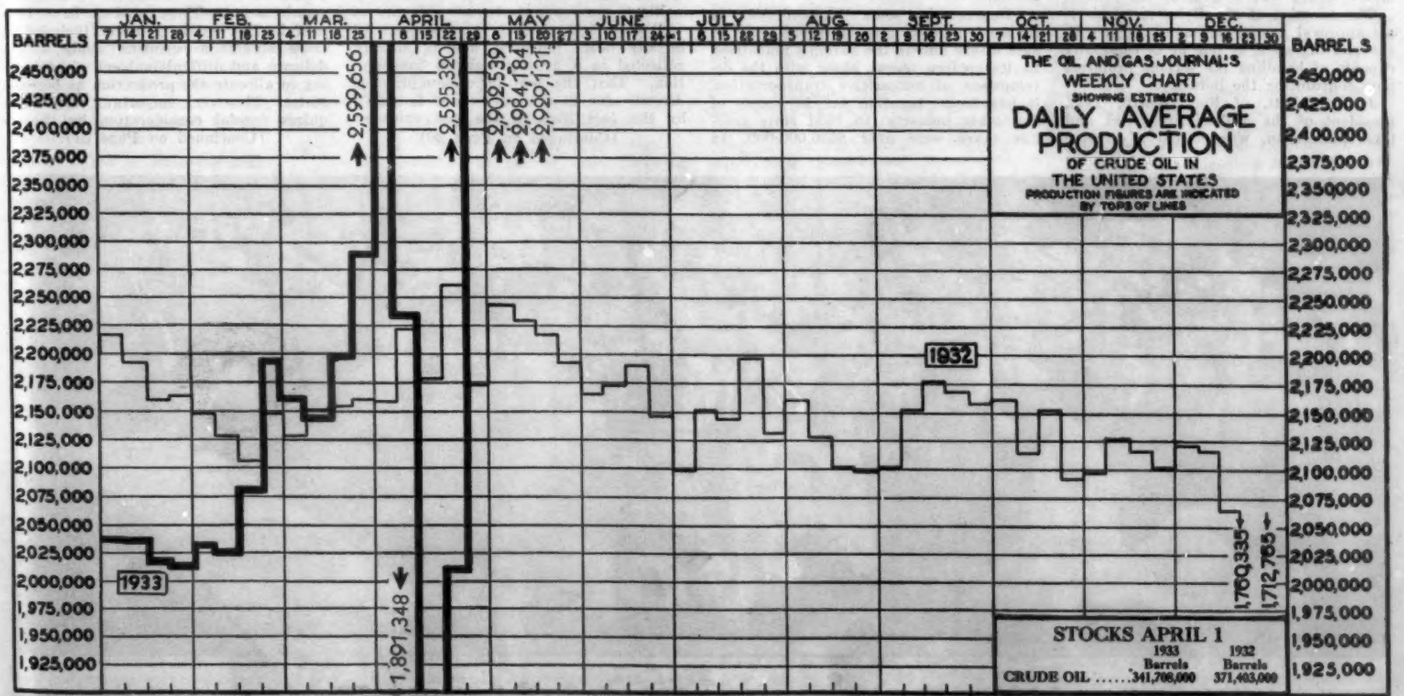
Consequently, with no effective action expected from the Texas Railroad Commission or the attorney general of Texas to curtail East Texas within any reasonable limit, the petroleum industry is confronted with a long period of overproduction with its resultant effect on prices, unless provisions of the Industrial Recovery Bill relating to overproduction and conservation of natural resources are applied to East Texas.

Crude Oil Production in the United States

Estimated daily average production for the week ending May 20, and a comparison with previous week and one year ago, follows:

	May 20	May 13	May 21, 1932
Oklahoma—			
Oklahoma City	167,115	175,865	99,530
Seminole-St. Louis	106,320	93,540	121,815
Remainder of State	194,115	194,915	208,975
Total Oklahoma	467,550	464,320	430,320
East Texas—			
Lathrop	421,945	435,645	127,050
Kilgore	297,880	329,390	103,459
Joiner	300,535	308,145	107,573
Total East Texas	1,020,340	1,073,180	338,082
West Texas	159,746	157,746	184,538
North Central Texas	69,055	70,805	77,295
Texas Panhandle	43,115	43,695	52,812
East Central Texas	58,442	58,561	56,960
Gulf Coast—Texas	183,325	186,312	109,993
Southwest Texas	55,254	53,733	59,205
Total State of Texas	1,589,277	1,644,032	878,885
Kansas	110,730	116,210	95,870
North Louisiana	26,195	27,435	29,430
Gulf Coast—Louisiana	41,453	42,246	41,136
Arkansas	29,915	29,945	34,365
Eastern Fields	106,000	107,000	119,000
Rocky Mountain area	73,011	74,996	86,356
California—			
Santa Fe Springs	54,000	54,500	64,750
Long Beach	73,750	73,750	81,750
Playa Del Rey	12,000	11,500	18,750
Elwood	13,500	13,250	16,750
Kettleman Hills	63,350	62,000	56,000
Remainder of State	268,400	263,000	266,000
Total California	485,000	478,000	504,000
Total United States	2,929,131	2,984,184	2,219,362

Decrease, 55,053 bbls. daily.



Opportunity to Exchange Views on Important Subjects Made A. P. I. Meeting Profitable

The third semiannual meeting of the Division of Production, Refining and Marketing of the American Petroleum Institute, held in Tulsa last Wednesday, Thursday and Friday, was exceptionally profitable to those in attendance because of the clearer understanding obtained from the discussions of the different problems confronting the industry. Leaders in thought and action of the different branches of the oil business were present at the sessions of the divisions and presented their views on matters of especial interest at this time.

With such a large gathering of engineers and other technical men those who attended the various group sessions were given an opportunity to obtain first-hand the results of long and intensive studies of questions uppermost in the minds of so many right now. East Texas, naturally came in for a lion's share of the discussion among production men and in the thousand and one informal discussions which started with the arrival of the first persons to attend the meeting.

Representatives of many manufacturers of equipment for the oil fields swelled the attendance at the meeting. Among this group, at least, there was a very definite spirit of optimism regarding the business outlook. Many pointed to substantial increases in orders their firms are receiving as positive proof conditions have improved greatly.

Byles Elected President

Axtell J. Byles, president of the Tide Water Oil Co., was elected president of the Institute to succeed Judge C. B. Ames who resigned to accept the position of chairman of the board of The Texas Corporation. The directors of the Institute amended the provision in the by-laws of the organization that the president must be elected at the annual meeting, and they elected Mr. Byles to serve until December 31, 1934. Otherwise his term would have expired next October when the next annual meeting of the Institute is to be held. It is said Mr. Byles' salary will be $75,000 per year.

The selection of Mr. Byles met universal approval among the many oil men at the meeting as it is felt he is especially capable of handling the serious problems now confronting the industry.

J. D. Collett, of Fort Worth, Tex., president of the Mid-Continent Oil and Gas Association, was elected a director of the Institute to succeed the late John H. Markham of Tulsa.

Industries Committee Active

One of the most active organizations in the American Petroleum Institute is its recently organized American Petroleum Industries Committee of which Harry T. Klein of The Texas Company is chairman and Gen. Baird H. Markham is director. Both Mr. Klein and General Markham made reports on the work of the committee. The scope of its work is indicated by the fact that, although it was only created by the directors at the Institute meeting in Houston last November it has been largely instrumental in the opposition which has been developed to bills proposing to increase the rate of gasoline taxes; the diversion of gasoline taxes from highway purposes; chain store taxation; gasoline tax evasion; the blending of alcohol with gasoline; and railroad truck legislation.

Pleads for Co-operation

In the absence of Mr. Byles who was unable to attend the meeting in Tulsa, Judge Ames delivered the President's address at the general session. He spoke in part as follows:

"I think sometimes some of us, not many, are prima donnas. We want to sing a solo part instead of remaining in the chorus, and we need a strong chorus to carry this industry forward. I therefore ask your co-operation with your new president.

"Co-operate not only with the president, with the executive vice president, with the staff of the Institute, but co-operate with the officials of the states who are charged with the duty of enforcing the laws of the states relating to the production of oil. These gentlemen have a difficult task. If the industry were united, if the industry would take to them one program, it would be comparatively easy to convince them that that program was sound, but when groups within the industry take a half dozen programs, these public officers, not being skilled experts, are placed in a difficult position and may be excused if mistakes are made.

"I say particularly we should co-operate with the enforcement officers of these three states, Kansas, Oklahoma and Texas, which have market demand statutes, in order to enable them to understand what those statutes mean and how to apply them. What is the market demand for crude oil? Is there a market demand in Texas for 1,600,000 bbls. a day, which is now being produced, and most of which is being purchased? Is there a market demand for close to 3,000,000 bbls. a day in the United States, when only 2,200,000 bbls. are being consumed?

"I think the industry has an opportunity itself of doing a constructive thing by trying to agree within itself as to what is the meaning of reasonable market demand. If we can all agree that the reasonable market demand for crude oil is such an amount of crude oil as will meet the requirements of the consumer, then we can help these state agencies in administering the law. But if we are going to keep up the haphazard system of nominations and allow market demand to be what any group or any individual says he wants, we will not have, and cannot expect a sound, constructive administration of these statutes.

"Let us co-operate with these three states in an effort to get them to co-operate with each other. Is Texas to say 1,600,000 and Oklahoma 1,000,000 and Kansas 250,000, without any conference with each other? They certainly don't consume it within their borders. The products are consumed throughout the world. Aren't they entitled to know the judgment of the industry, not only as to the total but as to how much should be allocated to each state?

"There are numerous factors involved. These gentlemen who are trying to enforce the law are entitled to the solid judgment of the industry on these questions, and we have never presented it to them. I do not believe there has ever been an expert study of the whole problem, much less a presentation of it to our public officers. We have had, for several years, careful forecasts of consumption requirements. These studies have been useful. But we have never included in these studies a scientific study of the delicate and difficult subject of attempting to allocate the production as between states. This very important subject requires careful consideration by the in-

(Continued on Page 31)

Administration Told Overtaxation One Big Cause of the Oil Industry's Ills

The board of directors of the American Petroleum Institute at its meeting in Tulsa last week, approved and sent the following communication to President Franklin D. Roosevelt, Vice President John N. Garner, Speaker Henry T. Rainey and others, including congressmen for the oil-producing states:

"The petroleum industry is suffering not only from the general business depression, but from certain special conditions peculiar to itself. Chief among these is overtaxation of its leading products—gasoline and lubricants.

"Representing some $12,000,000,000 in invested capital, this is second only to agriculture among the nation's industries. In its modern phase, along with the development of automotive transportation, it has borne taxation far in excess of any other industry. In 1931 state gasoline taxes were over $536,000,000. In 1932 the Federal Government added 1 cent per gallon, which is now producing about $138,000,000 annually. Originally limited to one year, this is to be extended another year; and on top of this another cent Federal tax is now suggested, as the principal means of financing the $3,000,000,000 public works program.

"Already the weighted average of state gasoline taxes exceeds 4 cents per gallon. Adding the 1-cent Federal levy, the total of over 5 cents is far above the average manufacturer's cost of gasoline. That is a Simon-pure manufacturer's sale tax of well above 100 per cent. It is unparalleled in any other industry, and is already reflected in a greatly reduced consumption. That the loss in consumption is directly due to excessive taxes is shown by the fact that in the last calendar

(Continued on Page 30)

Some of the 1,000 oil men who attended the barbecue and entertainment at the Tulsa Country Club arranged by Tulsa oil companies and other business concerns for those attending the American Petroleum Institute Divisional meetings

Oil Dictatorship Bill Sidetracked by Committee; Industry Recovery Bill Being Pushed Instead

By CHARLES E. KERN
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., May 23.—The oil situation was placed before Congress by a special message from President Roosevelt Friday but without specific recommendation. Senator Capper and Representative Marland introduced revised identical bills for Federal control under the direction of Secretary Ickes. The prevalent opinion that the oil industry should instead be included in the industry recovery bill on the same basis as other industries was attacked by advocates of a dictatorship but the disinclination of the President to endorse their scheme seemed to dispose of that.

Although the President in his letter had suggested that the industry recovery bill might be amended to provide Federal aid for oil, he informed Chairman Doughton of the house ways and means committee that the committee could proceed with the general measure without action upon the oil proposal.

The President is anxious for speedy enactment of the recovery bill and increasing opposition to the Marland-Capper bill would have delayed matters. After Chairman Doughton visited the President he announced that the Marland bill would not be reported as a rider on the recovery bill but would be considered separately. This would expedite the report on the industries bill and met the approval of the President.

The committee on ways and means after approving the plan to raise the normal income taxes, disallow exemptions on corporation dividends and increase the gasoline tax three-quarters of a cent, gaining a total of $220,000,000 adopted a provision that the President may suspend this program on repeal of the Eighteenth Amendment. The President would also be authorized to suspend these new levies when conditions justify suspension. Among the excise taxes continued until July 1, 1935, is that on oil pipe lines.

Chairman Doughton later announced that plans for passage of the industries bill carrying the three-quarters of 1 cent additional Federal gasoline tax provided debate begin Thursday with final vote on Friday. House Republication Leader Snell said he had no hope of stopping approval. Mr. Doughton thought the recovery bill broad enough to take care of the oil legislation.

Text of Industry Bill

The general provisions of the industry recovery bill are:

Section 1. A national emergency productive of widespread unemployment and disorganization of industry, which burdens interstate commerce, affects the public welfare, and undermines the standards of living of American people, is hereby declared to exist. It is hereby declared to be the policy of Congress to remove obstructions to the free flow of interstate commerce which tend to diminish the amount thereof; and to promote the organization of industry for the purpose of co-operative action among trade groups, to induce and maintain united action of labor and management under adequate governmental sanctions and supervision, to eliminate unfair competitive practices, to reduce and relieve unemployment, to improve standards of labor, and otherwise to rehabilitate industry and to conserve natural resources.

Administrative Agencies

Sec. 2. (a) To effectuate the policy of this title, the President is hereby authorized to establish such agencies, to accept and utilize such voluntary and uncompensated services, to appoint, without regard to the provisions of the civil service laws, such officers and employes, and to utilize such Federal officers and employes, and, with the consent of the state, such state and local officers and employes, as he may find necessary, to prescribe their authorities, duties, responsibilities, and tenure, and, without regard to the Classification Act of 1923, as amended, to fix the compensation of any officers and employes so appointed.

(b) The President may delegate any of his functions and powers under this title to such officers, agents, and employes as he may designate or appoint, and may establish an industrial planning and research agency to aid in carrying out his functions, under this title.

(c) This title shall cease to be in effect and any agencies established hereunder shall cease to exist at the expiration of two years after the date of enactment of this act, or sooner if the President shall by proclamation declare that the emergency recognized by Section 1 has ended.

Codes of Fair Competition

Sec. 3 (a) Upon the application to the President by one or more trade or industrial associations or groups, the President may approve a code or codes of fair competition for the trade or industry or subdivision thereof, represented by the applicant or applicants, if the President finds (1) that such associations or groups impose no inequitable restrictions on admission to membership therein and are truly representative of such trades or industries or subdivisions thereof, and (2) that such code or codes are not designed to promote monopolies or to eliminate or oppress small enterprises and will not operate to discriminate against them, and will tend to effectuate the policy of this title. The President may, as a condition of his approval of any such code, impose such conditions (including requirements for the making of reports and the keeping of accounts) for the protection of consumers, competitors, employes, and others, and in furtherance of the public interest, and may provide such exceptions to and exemptions from the provisions of such code, as the President in his discretion deems necessary to effectuate the policy herein declared.

(b) After the President shall have approved any such code, the provisions of such code shall be the standards of fair competition for such trade or industry or subdivision thereof. Any violation of such standards in any transaction in or affecting interstate commerce shall be deemed an unfair method of competition in commerce within the meaning of the Federal Trade Commission Act, as amended. A violation of any provision of any such code shall be a misdemeanor and upon conviction thereof an offender shall be fined not more than $500 for each offense.

(c) The several district courts of the United States are hereby invested with jurisdiction to prevent and restrain violations of any code of fair competition approved under this title; and it shall be the duty of the several district attorneys of the United States, in their respective districts, under the direction of the Attorney General, to institute proceedings in equity to prevent and restrain such violations.

(d) Upon his own motion, or if complaint is made to the President that abuses inimical to the public interest and contrary to the policy herein declared are prevalent in any trade or industry or subdivision thereof, and if no code of fair competition therefor has theretofore been approved by the President, the President, after such public notice and hearing as he shall specify, may prescribe and approve a code of fair competition for such trade or industry or subdivision thereof, which shall have the same effect as a code of fair competition approved by the President under Subsection (a) of this section.

Agreements and Licenses

Sec. 4 (a) The President is authorized to enter into agreements with, and to approve voluntary agreements between and among, persons engaged in a trade or industry, labor organizations, and trade or industrial organizations, associations, or groups, relating to any trade or industry, if in his judgment such agreements will aid in effectuating the policy of this title with respect to transactions in or affecting interstate commerce, and will be consistent with the requirements of Clause (2) of Subsection (a) of Section 3 for a code of fair competition.

(b) Whenever the President, after such public notice and hearing as he shall specify, shall find it essential to license business enterprises in order to make effective a code of fair competition or an agreement under this title, or otherwise to effectuate the policy of this title, and shall publicly so announce, no person shall, after a date fixed in such announcement, engage in or carry on any business, in or affecting interstate commerce, specified in such announcement, unless he shall have first obtained a license issued pursuant to such regulations as the President shall prescribe. The President may suspend or revoke any such license, after due notice and opportunity for hearing, for violations of the terms or conditions thereof. Any order of the President suspending or revoking any such license shall be final if in accordance with law. Any person who, without such a license or in violation of any condition thereof, carries on any such business for which a license is so required, shall, upon conviction thereof, be fined not more than $500, or imprisoned not more than six months, or both, and each day such violation continues shall be deemed a separate offense.

Sec. 5. While this title is in effect and for 60 days thereafter, any code, agreement, or license approved, prescribed, or issued and in effect under this title, and any action complying with the provisions thereof taken during such period, shall be exempt from the provisions of the antitrust laws of the United States.

Limitations Upon Application of Title

Sec. 6 (a) No trade or industrial association or group shall be eligible to receive the benefit of the provisions of this title until it files with the President a statement containing such information relating to the activities of the association or group as the President shall by regulation prescribe.

(b) The President is authorized to prescribe rules and regulations designed to insure that any organization availing itself of the benefits of this title shall be truly representative of the trade or industry or subdivision thereof represented by such organization. Any organization violating any such rule or regulations shall cease to be entitled to the benefits of this title.

(c) Upon the request of the President, the Federal Trade Commission shall make such investigations as may be necessary to enable the President to carry out the provisions of this title, and for such purposes the commission shall have all the powers vested in it with respect of investigations under the Federal Trade Commission Act, as amended.

Dictatorship Bill

The Marland-Capper bill follows the general outline published in The Oil and Gas Journal of May 11 but with important revisions. It now includes natural gas.

Allocation to the producing states of the total market demand are to be made by the Secretary of the Interior. Where any state fails to accept the amount determined as its equitable proportion of the nation's production the secretary would be authorized to appoint an emergency committee, representative of the public interest in such state, to prorate equitably the state's production to pools, areas or common sources of supply. In case such committee cannot agree, the secretary himself may establish these production allowables.

The secretary is directed in order to prevent premature abandonment of wells

(Continued on Page 44)

President Roosevelt's Oil Message to Congress

The Congress is doubtless aware a serious situation confronts the oil producing industry.

Because oil taken from the ground is a natural resource which once used cannot be replaced, it is of interest to the nation that its production should be under reasonable control for the best interests of the present and future generations.

My administration for many weeks has been in conference with the governors of the oil-producing states and with component parts of the industry, but it seems difficult, if not impossible, to bring order out of chaos only by state action.

In fact, this is recognized by most of the governors concerned.

There is a widespread demand for Federal legislation.

May I request that this subject be given immediate attention by the appropriate committee or committees?

The Secretary of the Interior stands ready to present any information or data desired.

May I suggest further that in order to save the time of the special session it might be possible to incorporate action relating to the oil industry with whatever action the Congress decides to take in regard to other industries—in other words, that consideration should be given at the same time that action is taken on the bills already introduced and now pending in committee.

Trend Toward Higher Octane Number in Motor Fuel Despite Unwarranted Cost in Some Cases

By W. T. ZIEGENHAIN

"There is nothing static or arbitrary in refining today." That statement was made by Dr. Gustav Egloff of the Universal Oil Products Co. in one of the meetings of the manufacturing group during the convention of the American Petroleum Institute in Tulsa during the past week. It was substantiated by the wealth of new data presented at the meetings and the speed with which new equipment and methods of processing are being investigated to replace the "conventional" as shown by the papers.

Principal Changes

In the manufacture of the two principal products of crude oil, motor fuel and lubricants, a factor has entered into each which promises to greatly alter if not revolutionize present practices.

In the case of making motor fuels it is the "Q" brand of ethyl fluid and in the manufacture of lubricants it is the use of propane and selective solvents for dewaxing.

There is a rather general acceptance of the merits of each proposal from a technical standpoint but it has been difficult to interpret the economies of the changes when consideration is given the fact that the public is not willing to pay much of a premium for added quality.

Effect of "Q" Brand

If the adoption of the "Q" brand of ethyl is for the purpose of permanently relieving refiners of the investment and costly operation of reforming units those not so equipped naturally favor the move. If it is to be used as a temporary measure to nurse along those who have alowed up in the octane race, it is given a different reception. Outwardly at least, those who expressed their views on the subject within and outside the meetings were insistent that some limit be observed. However, similar pleas have been made before and the net result of such meetings has been that one by one the company would raise the octane value of its fuel above that of its competitors only to be outdone by another a few months later.

Also, there was nothing concrete presented either in the form of a recommendation from the A.P.I. board of directors nor agreement among the rank and file of the refiners that any limit be observed. The field still remains open to those who wish to participate and by making the "Q" brand available May 27, it is conceded by many that interest in the race will be increased rather than decreased and the net result will be a furthering of the program to make the buying public more "octane" conscious.

The costly procedure of supplying a motor fuel of 70 octane value in a car needing only a 60 octane gasoline is regrettable, no doubt, but salesmanagers have had the wrath of their executives fall upon them with every complaint received and they say that if they are expected to offer a gasoline that is to operate satisfactorily in every car on the road it is necessary to maintain this margin of safety.

No Chance of Agreement

Realizing that the chance of getting all parties to agree on a limit of octane value on their motor fuel is next to impossible the next best thing to do is to meet such competition at as low an expense as warranted. This causes an indefiniteness of plans among refiners but this will probably continue as long as the motor manufacturer is able to convert "high mean effective pressure" in the engine into terms of speed, power and economy which the buyer of both automobiles and gasoline is demanding.

East Texas Crude Cracking

BREAK-UP OF CRUDE BEFORE CRACKING

	Per Cent of Crude
Light gasoline (300 deg. F. end point, octane No. 71)	15
Naphtha	25
Topped crude	60

CRACKING YIELDS BASED ON TOPPED CRUDE AND NAPHTHA

	Run "A"	Run "B"	Estimated yields when producing 300-viscosity residue
Gasoline, per cent of topped crude and naphtha	55.0	57.5	43.0
Vapor pressure, Reid, lb. per sq. in.	11.0	11.0	11.0
Endpoint, deg. F.	410	390	400
Octane No.	77	74	77
Residuum, per cent of topped crude and naphtha	33.7	34.9	22.0
Gravity, deg. A.P.I.	14.9	12.6	8.0
Basic sediment and water, per cent	0.3	0.2	0.3
Viscosity, Saybolt Universal, at 122 deg. F.	45	36	300
Loss, per cent of topped crude and naphtha	11.3	7.6	15.0
YIELDS BASED ON ENTIRE CRUDE			
Cracked gasoline, per cent	46.8	48.8	53.5
Straightrun gasoline, per cent	15.0	15.0	15.0
Total gasoline, per cent	61.8	63.8	68.5
Octane No.	75	73	75
Residuum, per cent	28.6	29.6	18.8
Loss, per cent	9.6	6.6	12.7

This brings up the question of how much can be done by the motor car manufacturer to improve the design of the engine to suppress the knock and how much the refining industry must do to meet the problem. In the various meetings held during the week there was a rather general expression of doubt that the automobile designer was giving heed to the added cost of the fuels needed in the higher compression engines. The idea was expressed that once the motor manufacturer finds motor fuel of higher octane value generally available, he boosts the compression ratio or changes other pertinent parts of his motor and that he will continue to do this until a halt is called in the refining industry. However, nothing definite was suggested at any of the meetings to bring this about.

Cracking

Hand in hand with the problem of supplying a fuel of high antiknock value is the subject of cracking, particularly reforming. A symposium on the subject was held Friday afternoon in which fundamental data were presented for the purpose of determining the economic aspect of varying temperature, pressure and time of reaction in the modern cracking unit, all of which were extended to cover reforming conditions. J. T. Ward as joint author with P. C. Kieth, Jr., and L. C. Rubin of the Gasoline Products Co., read a paper on the "Cracking of Mid-Continent Virgin Gas Oil Over a Wide Range of Temperatures and Pressures" in which such data were presented. These data were derived from an experimental cracking unit described in this issue on page 53.

Basing his conclusions on the data obtained on a "once-through" basis when cracking virgin gas oil made from Mid-Continent crude, Mr. Ward said:

"That if cracking conditions are so maintained that tar formation is minimized, the general equation for a monomolecular reaction can be utilized satisfactorily to correlate the data when the amount of material cracked is expressed in terms of gasoline plus gas as a function of time.

"That within the limits studied, pressure has no effect on the reaction rate as defined.

"That the amount of fixed gas per unit of gasoline produced varies inversely as the pressure.

"That the amount of gas produced is not necessarily a measure of the octane number as measured by the C.F.R. motor method; and that for a given octane number, as measured by this method, the higher the pressure, the smaller the gas-gasoline ratio."

With particular reference to a reforming operation Dr. Gustav Egloff discussed new developments in cracking. He cited the large increase in the production of cracked gasoline and the declining percentage of straightrun gasoline being made as shown by the figures compiled by the Bureau of Mines. Justification for this, he said, was in the fact that modern cars could not utilize some straightrun gasolines. In discussing the economics of the trend in this direction, he said.

"Economically, the processing of these stocks appears, under certain conditions, to be unwarranted; for one starts with a gasoline having satisfactory properties in all respects except octane rating and incurs the expense of a cracking operation, plus loss of gasoline. Yet, without cracking, many of the gasolines distilled from crude oil are unsalable or are sold as third-grade products. With a number of crude oils it is more economic to distill out a low-boiling fraction and crack the naphtha instead of reforming the entire gasoline. In certain cases it is necessary to process the gasoline in its entirety, due to the fact that all fractions thereof are of low octane rating.

"It is interesting to point out that, in processing high-sulphur gasolines, reforming (or cracking) reduces the sulphur content of the gasoline substantially. In reforming a West Texas gasoline containing 0.19 per cent sulphur, the product of 76 octane number had a sulphur content of 0.07 per cent.

"A number of refiners who are reforming gasolines do not refine the product beyond the addition of an inhibitor to keep the gum down, with or without the use of a dye to color the finished gasoline.

"Although the processing of straightrun gasoline and naphtha on a 'once-through' cracking basis under temperatures to 1,000°F. and pressures to 750 pounds on the heating coil have been satisfactory in producing high-octane gasoline, it is thought that in view of the limited flexibility of a unit without a reaction chamber, provision should be made in the design for a reaction chamber, so that, if found necessary at a later date, hot-oil pumps and auxiliary equipment for the re-cycle operation may be installed to process any type of charging stock.

"Cracking tests were conducted on Pennsylvania, Mid-Continent, and mixtures of Mid-Continent and West Texas gasolines and naphthas, and also Joiner (Texas), and East and West Texas gasolines.

"On the basis of these experiments, there seems to be no particular advantage, as far as yield and octane number of the gasolines are concerned, whether the straightrun gasolines or the naphthas are cracked separately or not.

"When producing gasoline by blending the reformed naphtha product with the light ends of the straightrun gasoline from which the naphtha was derived, the octane number of the final gasoline is a function of the amount of naphtha reformed.

"As the per cent of naphtha which must be reformed to obtain a given octane number increases, a point is reached where it is more economic to process the entire gasoline, rather than go to the expense of fractionating out a small percentage of light fractions."

In his discussion of results when cracking East Texas crude Doctor Egloff indicated that a yield of 63 per cent of 77 octane motor fuel may be recovered while making a 300 viscosity residue. The summary of the data is included here in tabular form.

Motor Car Manufacturers Could Help to Solve the Vapor Lock Problem

By DR. O. C. BRIDGEMAN
Bureau of Standards*

About a year ago, the Bureau of Standards undertook an extension of the vapor lock investigation in co-operation with the Natural Gasoline Association of America, the work being conducted under the auspices of the co-operative fuel research steering committee. The main object of the extended investigation was to obtain data on the vapor locking characteristics of fuels of different characteristics when run in typical cars on the road. The present paper covers the information obtained in the vapor lock road tests, indicates how this information supplements the data previously obtained in the laboratory and in the fuel line temperature work, and points out what remains to be done in order to complete the investigation.

General Vapor Lock Problem

Vapor lock is fundamentally a vapor pressure phenomenon. There are three important phases of the practical vapor lock problem:

1. The temperatures reached in fuel systems under various operating conditions.
2. The vapor-handling capacity of fuel systems.
3. The vapor pressure characteristics of fuels.

For a given fuel being used in two cars having fuel systems with the same vapor-handling capacity, there will be a greater tendency for vapor lock to occur in that car which has the higher fuel line tem-

(Continued on Page 30)

*Abstract prepared by Dr. O. C. Bridgeman of his discussion before the Natural Gasoline Association of America in Tulsa, May 17.

Expanding Outlets for Heavier Products Draw Attention of Marketers at A.P.I. Meeting

By C. O. WILLSON

Petroleum marketers gathered together in Tulsa last week in connection with the semiannual meeting of the American Petroleum Institute gave special attention to the expanding outlets for their products other than gasolines.

The prospects for continued growth in the demand for many of the heavier fractions obtained in refining crude oil came as a pleasant relief to distributors who assembled in convention at a time when the markets for crude oil and its principal product—gasoline—were the most unsatisfactory in the history of the Institute. The situation was not aided when data of unquestioned accuracy were offered by the A.P.I. economics committee showing that the demand for this crude oil and motor fuel over the next six months would continue to show a substantial decrease when compared with the same period last year.

In contrast to this outlook, figures were presented showing the remarkable record that has been made in one section of the country in enlarging the market for a fraction of crude oil which in the past has been considered largely a by-product. Starting from scratch a few years ago an outlet for a distillate or kerosene known as range oil has been developed in the New England states and last year it was estimated that this market absorbed 200,000,000 gallons, or 5,000,000 bbls. of this product. The paper presented at a meeting of the marketing division by L. F. Speare and C. B. Cooley of Gilbert & Barker Manufacturing Co., explained this development which many believe to be the most important from the standpoint of the industry's markets since the advent of the internal combustion engine.

Demand for Range Oil

The presentation of this paper which will be found elsewhere in this issue, was accompanied by lantern slides showing the types of burners adaptable to the various heating requirements of homes in the New England states. The rapid consumer acceptance of these new heating devices indicated by the fact that more than 500,000 have been installed over the past three years is due to relatively low installation expenditure, convenient service and low operating costs. The entrance of the oil industry into the field of household heating has been steady over the past several years through the medium of oil burning furnaces. The new market supplements this service and it is claimed due to the relatively low costs has much greater possibilities. The potential demand from a home owner in the rural sections and towns and cities not served with gas exceeds that of gasoline. Those who have made a study of this development are confident that what has been done in New England states can be duplicated in other sections of the country creating a new market which might quickly exceed 50,000,000 bbls. yearly provided the necessary co-operation is given the burner manufacturers by distributors of petroleum products. The growth in the East has been largely dependent on the willingness of the oil companies to furnish a distillate fuel of suitable specifications and also make it readily available to consumers at prices which have permitted expansion during a depression period.

The paper was of special interest to a large number of refiners in the Mid-Continent and Middle West. In that territory the demand for distillate and kerosene over the past year has been greater than expected and for the entire country the domestic demand for these products in 1932 was greater than in 1931, according to government reports. Investigations have been made by individual Mid-Continent companies and they have found that small inexpensive burners suitable for cooking and light heating are being introduced at several points in the Middle West and this fact has increased the regular demand for kerosene and distillate. The importance of this development is shown in the fact that prices at refineries over a large part of the United States come within the price ranges of the various grades of gasoline. At several points, kerosene and the best grades of distillates are commanding a premium over refinery gasolines and natural gasolines.

Standardizing Asphalts

E. F. Kelley, of the U. S. Bureau of Public Roads, and Prevost Hubbard of the Asphalt Institute, told the marketers of the progress being made in securing uniform specifications for asphalts used in the building and maintenance of improved roads. It has been known among refiners and marketers for some time that the most serious handicap, preventing the rapid expansion in the demand for petroleum asphalts, has been the lack of standard specifications to cover the several requirements in road building. Asphalts and road oils have been sold which were not suitable and as a result the growth in the market, potentially as large as that of gasoline, has been retarded. The reduced revenue of states and other governmental units has aided this market, it was explained by speakers due to the necessity of economy in road building. It was also stated that with many of the main highway systems completed, more attention is being paid to secondary systems where asphalts are particularly adaptable. The accompanying table gives proposed specifications for liquid asphaltic road materials recommended by the U. S. Bureau of Public Roads and presented to the marketing division by Mr. Kelley.

Diesel Fuels

One of the most interesting papers presented at the meetings of the marketing division was that of A. G. Marshall, of the Shell Oil Co., covering a study of the ignition quality of Diesel fuels. This investigation and others which recently have been made available to the industry, show there is considerable variation in the performance of Diesel fuels of the same general physical properties. The paper explained the octane number rating which accurately determines the ignition properties of the fuels. This method of testing corresponds to octane ratings in the case of gasoline. The speaker explained that in general a Diesel fuel secured in a cracking operation at a refinery has a lower cetene number than a straightrun fuel from the same crude oil. He also said that a stove oil of higher gravity will have a higher cetene number than one of lower gravity but similar volatility, and a less volatile stove oil will have a higher cetene number than one of greater volatility, all other factors being equal.

Gasolines

While there was considerable discussion among small groups meeting informally around the hotels regarding present unsatisfactory conditions in gasoline marketing, these discussions were not carried to program meetings. At the meeting of the Central Committee on Refinery Technology there was considerable discus-

(Continued on Page 31)

High Points of A. P. I. Marketing Division Meetings

Ask for a fair deal in the matter of regulating use of buses, trucks and other heavy duty motor vehicles which now require more than 25 per cent of all the gasoline consumed in United States.

Present data showing there is direct relationship between decline in gasoline consumption and increase in gasoline tax rates.

Large potential market for distillate and kerosene immediately available through expanding use of range and other inexpensive heaters for homes and small buildings.

Adoption of standard specifications for liquid asphalts and greater knowledge of their application in road building assures rapid expansion in demand.

Defense of Code of Ethics as having accomplished many of the objectives of its founders.

Request directors of Institute to provide for standing committee on credit practices covering sale of petroleum products. Plan provides for organization on regional basis with representation on the various code of ethics committees.

To continue work under way which aims to secure co-operation of car manufacturers in designing fuel systems so that present vapor pressure limits for motor fuels can be increased at least 2 pounds. This work is under supervision of Committee on Testing Methods and Specifications.

Condemn proposal to blend alcohol with gasoline as unfair to oil industry. Blending would result in production of inferior motor fuels at higher costs to the consumer with no advantage to agricultural interests for whom the plan was conceived.

PROPOSED SPECIFICATION REQUIREMENTS FOR LIQUID ASPHALTIC ROAD MATERIALS

	Material type												
Test requirements—	SC-1	SC-2	SC-3	SC-4	MC-1	MC-2	MC-3	MC-4	MC-5	RC-1	RC-2	RC-3	RC-4
Water and sediment, per cent	2.0—	2.0—	2.0—	2.0—	.....	.....	.....	.....	.....	.....	.....	.....	.....
Flashpoint, °F.	150+	200+	200+	250+	.....	150+	150+	150+	150+	80+	80+	80+	80+
Viscosity, Saybolt Furol at 77° F., sec.	20–150	.....	.....	.....	40–150	.....	.....	.....	.....	.....	.....	.....	.....
Viscosity, Saybolt Furol at 122° F., sec.	.....	200–329	.....	.....	.....	.....	.....	.....	.....	80–160	200–400	.....	.....
Viscosity, Saybolt Furol at 140° F., sec.	.....	.....	150–300	350–550	.....	150–250	300–500	500–800	.....	.....	.....	275–400	700–1,400
Viscosity, Saybolt Furol at 180° F., sec.	.....	.....	.....	.....	.....	.....	.....	.....	170–280	.....	.....	.....	.....
Total distillate to 374° F., per cent by volume	.....	.....	.....	.....	.....	.....	.....	.....	.....	5+	.....	.....	.....
Total distillate to 437° F., per cent by volume	.....	2—	2—	2—	10—	3—	2—	1—	1—	12+	10+	3+	0.5+
Total distillate to 600° F., per cent by volume	.....	15—	10—	8—	25+	10–20	8–20	16—	14—	25+	20+	14+	7+
Total distillate to 680° F., per cent by volume	50—	25—	20—	18—	50—	27—	25—	25—	20—	40—	35—	30—	25—
Float of residue, 122° F., sec.	50—	25+	25+	25+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penetration of residue, 100 g., 5 sec., 77° F.	.....	.....	.....	.....	70–300	100–300	100–300	100–300	100–300	60–120	60–120	60–120	60–120
Ductility of residue, 77° F., cm.	.....	.....	.....	.....	60+	60+	60+	60+	60+	60+	60+	60+	60+
Solubility of residue in carbon disulphide, per cent	99.0+	99.0+	99.0+	99.0+	99.5+	99.5+	99.5+	99.5+	99.5+	99.5+	99.5+	99.5+	99.5+
Recommended uses—													
Dust layer	X	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Primer	.....	.....	.....	.....	X	.....	.....	.....	.....	.....	.....	.....	.....
Surface treatments	.....	.....	.....	.....	.....	.....	.....	.....	.....	X	.....	.....	.....
Mixed-in-place construction:													
Aggregate, densely graded[1]	.....	X	X[3]	.....	.....	X	.....	.....	.....	.....	.....	.....	.....
Aggregate, open graded[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	X	X[3]	.....
Coarse aggregate[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	X	.....
Plant-mixed construction:													
Aggregate, densely graded[1]	.....	.....	X	X	.....	.....	X	.....	.....	.....	.....	.....	.....
Aggregate, open graded[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	X	X	.....
Aggregate, open graded[5]	.....	.....	.....	.....	.....	.....	.....	X	X	.....	.....	.....	.....
Coarse aggregate[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	X	X

[1]Maximum size not over 1 inch. Fairly uniform grading from coarse to fine with appreciable percentage passing No. 200 sieve.
[2]Maximum size not over 1½ inches. Fairly uniform grading from coarse to fine with little or no material passing No. 200 sieve.
[3]Maximum size not over 1 inch. Fairly uniform grading from coarse to fine with little or no material passing No. 200 sieve.
[4]Maximum size not over 1½ inches. Little or no material passing three-quarter inch screen.
[5]Under favorable conditions only.

Indiana Standard Explains New Policies Covering Marketing Practices in Middle West Area

By ALLAN JACKSON
Vice President, Standard Oil Co. (Indiana)

As we look back on the history of the oil industry for the last 10 years, we are forced to wonder whether current troubles have not been, after all, of the industry's own making. We are forced to conclude, if we are honest, that the long profits of the prosperous years before 1929 stimulated an overdevelopment of prospecting for oil, too much drilling, overbuilding of refineries and overdevel-

ALLAN JACKSON
Vice President in Charge of Sales, Standard Oil Co. (Indiana)

opment of marketing outlets. If the oil industry had been content in those years with a smaller price for its products and had avoided its great overdevelopment of plant and equipment, there still might be enough business at a reasonable profit today for the smaller number of participants then in the industry, instead of no profit for the many thousands more whom long profits invited in.

Within the last several years it has frequently been pointed out in articles and editorials in the oil trade press and in discussions among marketing executives that marketing spreads were too large. The growth in spread, coinciding with growing consumption, for a time meant large profits to both retailers and suppliers. But it also served as an inducement to expansion of the number of outlets much faster than the growth in demand warranted. The time came when even a 6-cent margin did not mean as much profit for the average retailer as a 3-cent margin once did, because the business was being split too many ways. Continuance of expansion of number of outlets under the stimulus of various unsound inducements will spell the ruin of the business.

The trend has been amply demonstrated. Margins up to 6 cents a gallon have been widely prevalent, and they have enabled some marketers to make the business unprofitable for everybody. When a thousand gallons of gasoline is sold by one man on a 3-cent margin he has gross earnings of $30. Divide that thousand gallons among 10 men and give them a 6-cent margin and each will make only $6. If one decides to share part of his long margin with the consumer in an effort to get a larger share of the business, his competitors will follow suit and the point will soon be reached at which no one of them is making enough to cover his marketing expenses. Simply explained, that is essentially the process through which marketing of motor fuel has passed. We are at the stage of no profit for any of the marketers and prevention of further overexpansion has become vital to preservation of the industry.

A writer on this subject expressed the view in an article published several years ago that any industry making a good profit is likely to be overdone in proportion to how little money it takes to get into it. The oil business has offered marked proof of that theory. By providing equipment, painting signs and furnishing nearly everything else needed except a lot and building, oil companies have made it easy for almost anyone to get into the oil business. The result we see in three to four service stations on nearly every good corner, all losing money, where one could handle the business and make a fair profit on a smaller margin.

Co-operative Buying

We have seen a large development of co-operative buying by the consumer. Why? The margin between refinery cost and market price, held up too long in the battle to obtain outlets and gallonage, has made it possible for the consumer to find his own way to a better price. It is really amazing, when we look back, to think how intent the industry has been on competing to obtain more outlets, and how little it has thought of keeping prices down to prevent overexpansion.

It has taken the abrupt decline in consumption to make us realize fully what we face if we continue expansion. There has, of course, been no lack of actual comprehension of the unsoundness and and unwisdom of many of the practices which have crept into marketing, but that comprehension has only recently reached the point of becoming a spark to set off some remedial action. We have as a guide in that action discussions which have taken place in code committees for the last three or four years. We even have as a guide some actual provisions in the industry's code which have not been adequately observed.

Changes in Policy

I recall that in 1931 the Standard Oil Co. (Indiana) inaugurated at that time a policy of discontinuing loans to dealers of new or used equipment except that used in handling motor oils. The policy was hailed at that time with practically uniform approval by marketing heads of other companies. It was a step in the right direction, but only a beginning.

Again in August last year Standard of Indiana found itself facing widespread prevalence of secret discounts and rebates. To bring this situation out into the open, it announced a policy of granting retail quantity discounts. The following developments were such that all marketers were glad to abandon that practice, but there has again grown up in place of it further secret price cutting by some marketers and granting of rebates and discounts below the posted prices. This has added materially to the proof accumulated over a long period that the retail marketer has had too large a margin to play with for the good of sound and ethical marketing, or to put it another way, that too large a price was being demanded of the consumer in an effort to keep up a retail profit spread that had become established under different conditions.

A self-acknowledged "price cutter" declared in an article published recently in one of the trade journals that margins of profit should have dropped about 1926 and it should then have become unprofitable to build more stations. Instead, margins were generally frozen—that is to say, contracts both with jobbers and in turn with retail dealers were made for long periods of time at wide, fixed margins.

Jobber and Dealer Margins

To the jobber or dealer these margins seemed to spell big profits without disturbing the price structure. The only way to an increased share of the business was to build more and still more stations. Jobbers built two or three stations in a town where only one was needed. Large companies spent millions fitting out dealers to compete with and undersell their own company stations and then built more stations to compete with both.

There were times, this writer said, when prices bore no relation to the refinery markets. Many jobbers entered the oil business at such periods because the policy of guaranteed margins and price protection on local price cuts virtually guaranteed every jobber a profit no matter what might happen.

I have gone back into history to show that for a long time there has been a growing realization in the industry that numerous features of our marketing policies and practices are at variance with the principles of good business. Under today's acute conditions their weaknesses stand out more sorely than ever. I believe it is evident that the industry cannot continue its marketing activities on anything like the basis which has grown up in easier times. Important changes are bound to result as a matter of self-preservation, whether we like them or not. Some of the remedies which have been harped upon at meetings and

(Continued on Page 30)

Revised Market Practices Necessary to Improve Conditions

My company has made a thorough study of the situation and has arrived at some clear-cut ideas as to steps which it believes are necessary to prevent further disintegration of good business procedure in marketing motor fuel and oil. Outstanding among these ideas are the following:

1. We believe all service station commercial discounts are inadvisable and should be eliminated.

2. We recognize the correctness of the industry's oft-expressed opinion that rates under lease and agency agreements are too high for preservation of business on a reasonable basis. We believe that the interests of retailers themselves will be served best in the long run if rentals are reduced to not more than one-half cent a gallon, and commissions are reduced to not more than 1 cent on third-grade and 2 cents on middle and premium brands, with possibly some special provision only in the metropolitan area of Chicago in recognition of the established differential there.

3. We believe that a fair application of the foregoing adjustment will require that where rentals greater than one-half cent a gallon cannot be changed a compensating change should be made in the commission so that the total rental and commission will in no case exceed 1½ cents for third grade and 2½ cents for medium grade and for premium grade.

4. We believe that flat rentals should be paid only on service stations for company operation, and then only when leases are for a period of five or ten years and are noncancellable.

5. We believe we should base all discounts and commissions to dealers on the normal prices and that in event of local price cuts the dealer should be required to absorb one-half thereof up to a maximum, for him, of one-half cent on third grade and 1 cent on medium and premium brands.

6. We believe that all sales to large consumers and to governmental units, national, state and local, should be on the regular scale of discounts, without special discounts of any kind.

7. We believe the time has come to put into effect Rule No. 1 of the Code of Marketing Practices which declares, "The practice of loaning or leasing gasoline pumps, tanks and other equipment is unsound and uneconomic, and should be discontinued at the earliest possible moment consistent with existing conditions." We feel that we ought to discontinue lending gasoline storage and dispensing equipment to our AAA connections as well as to dealers. We might maintain existing equipment as to painting and advertising, but if any such equipment becomes unfit for use, we feel that the lessor or dealer ought to replace it at his own cost. We feel oil companies should not handle or sell any gasoline or lubricating oil equipment.

8. We believe that, without prohibiting employment of agents or truck salesmen on a strictly commission basis, there should be no hauling contracts or yard prices.

9. We believe that we should make very sure that none of our dealers create local cut-price situations by cutting prices or giving fictitious invoices at subnormal prices in order to bring prices down for their own purposes.

10. We believe that during this period when the whole marketing situation is disturbed and in flux we ought to declare an armistice for at least a 60-day period in the battle for dealer and AAA outlets. We feel that in this time when moratoriums are popular a moratorium on trying to take business away from the competitor is in order to allow time for the whole situation to right itself on the new basis of marketing which is certainly in the making.

Oil Brightens Outlook of Conroe, Which Once Depended on Diminishing Lumber Industry

By THOMAS F. SMILEY

CONROE, Tex., May 22.—With development of a big new oil field under way alongside her, Conroe's state of mind is not unlike that of a man whose rich uncle has died, leaving him a fortune, but who, though keenly mindful of his nicer place in the sun, has decided not to buy a new car till after the lawyers are through settling the estate and he knows just how much he can count on.

Montgomery County, of which Conroe is the seat, feels much the same way, only the county, since it controls the major taxing machinery, experiences a sense of assuredness denied the town.

Until recently there was fear that lease owners would shorten the life of the field by drilling it up in frantic haste. In fact, it is said of the Conroe Field that a record was made there in the rapidity with which its limits were defined by drilling operations. One hundred strings of tools were being kept busy until early in the present year, when the operators took counsel with each other and agreed it was foolish to drill up the field in that fashion. They reduced the number of drilling operations by one-half. There are now about 50 strings of tools at work. So the threat of premature exhaustion of the flowing life of the field and the danger of throwing more unneeded crude on the market and thus further depressing prices have been sidetracked.

Then of course the demoralized condition of the oil industry at large has injected a tincture of pessimism into the boundless joy that once accompanied the discovery of a new oil pool.

Nevertheless, Conroe and Montgomery County are feeling fine, thank you, for if development of the field continues in the present orderly fashion and if the oil industry succeeds in banishing the jinx which has dogged it for several years, they foresee a measure of prosperity which the most irrepressible optimist would not have predicted two years ago.

Lumber Once Chief Industry

Fully to appreciate the brighter colors which now overspread this region's skies it must be understood that the manufacture of lumber used to be the principal industry here and that removal of timber from the land was steadily reducing its assessed valuation for tax purposes. Land covered with timber was assessed at $10 to $20 an acre. As soon as the timber had been cut off the assessed value fell to $5. At the height of Montgomery County's lumber activity about 25 sawmills were in operation. The lumber industry gave employment to 3,500 persons and the revenue derived from it was in the neighborhood of $3,000,000 a year.

Courthouse records tell the story of dwindling receipts from the taxes upon which Montgomery County depended to keep up its highways, its schools, its judicial machinery and so on. Back in 1920 the assessed value of property for state and county tax purposes was $12,000,000. In 1932 this had fallen to $9,500,000, chiefly as a result of inroads on timber with saw and ax. There was a bond issue of $1,500,000 and funding warrants of $80,000 to be taken care of. There was no denying that things looked anything but rosy.

"You were going down hill," it was remarked to W. P. Terrell, chief deputy tax assessor.

"Brother," responded Mr. Terrell, "we were so close to the bottom we could touch it."

But now an air of right good cheer pervades the courthouse. The assessment for 1933 has not been made yet, but it was estimated by County Judge R. H. Weatherly that it would be about $26,000,000, yielding an estimated revenue from taxation of $545,000 as compared with $200,000 in 1932, thanks to the increased value of land resulting from the discovery of the Conroe oil field by G. W. Strake.

Conroe's Prospects Brighter Too

And the town of Conroe has had a similar change of scenery. Ten years ago the Conroe Courier Almanac for 1923, published as a supplement to the newspaper then owned by O. Etheridge, now an oil operator in the Conroe Field, contained an article by Alba L. Bozarth on "Depleting Our Forest Resources." That writer said: "If you take the timber payroll away from Conroe it will look like a graveyard in six months."

While Conroe was far from resembling a cemetery before the Strake discovery it nevertheless was beginning to feel the same pinch of diminishing income that worried county officials. But simultaneously with the influx of boom hotels, barber shops, barbecues, soft drink stands and so on, which invariably attends the opening of a new oil field, the city officials, realizing that many of these mushroom enterprises never would get on the tax rolls, adopted measures to prevent them from eluding their share of the expense attending administration of the city's affairs. R. H. Minton, who had been installed as city manager, introduced an ordinance which imposed an occupation tax upon various newcomers who flocked to Conroe with the evident plan of getting quick profits while the boom was on and then moving to new pastures. This ordinance, which was promptly passed by the city council, imposed such annual taxes as: Pool room, $10 a table; peddler, $12.50; bakery, $25; bottled drinks, $25; automobile salesman, $50; taxicab, $15; barber shop, barbecue, grocery store, etc., $12.50. This started an immediate flow of income.

Other sources of revenue began to grow. For instance, 1,003 building permits were issued from the city manager's office from May 3, 1932 to May 3, 1933. Four hundred of these were issued in January of the present year. The permits covered all sorts and sizes of buildings from a cheap boom-town shack to a modern residence. The income from sewer and gas permits leaped upward. The water department is now yielding $2,098 monthly as compared with $640 a year ago. Water consumption has increased from 2,109,000 gallons a month to 7,360,000 gallons.

But the police force had to be increased. A long delayed street drainage job could be postponed no longer. Other expenses that attend increases in population had to be met. While the money received through the city's regular taxing power increased 20 per cent, the cost of running the city increased still more, and if it had not been for the revenue raised through the occupation tax, the newly opened oil field might have been regarded as a mixed blessing by the city until it should begin to share in the benefits in prospect for Montgomery County as a whole.

Just how much the population of Conroe has increased nobody can say with precision. Approaching the town by the main highway from the south, the motorist, before he reaches the built-up zone of Conroe as it was prior to the oil strike, passes through a lane 1½ miles long of typical boom-town structures. They are the heterogeneous collection of roughly built dwellings, stores, boarding houses, restaurants, etc., that have become a familiar sight wherever the lure of a new oil field has attracted men.

At the courthouse corner in Conroe the main highway intersects the Cleveland road, and the motorist who is bound for the oil field turns east here. As he leaves the old settled district he finds himself driving through another lane of boom-town structures. It is of about the same length as the one by which he entered Conroe.

Within the limits of the original town of Conroe the change from former days lies chiefly in the congestion encountered in the area surrounding the intersection of the two main highways. The one running north and south is Chambers Street and the one at right angles to it is Davis Street. Red and green lights now regulate traffic at this point. Neither thoroughfare is paved and in dry weather clouds of dust settle on buildings, awnings, automobiles and pedestrians and drift through open windows and doorways into stores, offices and living apartments.

What? Traffic Jams in Conroe?

Cars are parked thickly in this district. One of them backing out into the stream of machines moving through the narrow streets frequently causes a traffic jam. The sidewalks here are thronged. Stores, restaurants, newsstands, etc., are busy.

Right across Chambers Street from the courthouse is the post office, presided over for 12 years by Miss Leo Yell. (No, it is pronounced with two syllables, as if it were spelled ee-ell.) Miss Yell and her little force were swamped for a time by the sudden increase in the volume of mail when the rush to Conroe began, following the discovery of oil. She had only two regular clerks and one auxiliary clerk in addition to the three rural carriers. The Post Office Department in Washington, D. C., gave her five more auxiliary clerks. Although the augmented force is kept busy, its members at least have time for proper rest, something which the original staff did not have. It used to require only 30 minutes to make out the monthly report for the postal savings and money order division. Now it takes a whole day.

Miss Yell places the preboom population of Conroe at 2,400 and the present one at 8,000. This harmonizes with the estimate by City Manager Minton. How much of this added population will remain as a permanent part of Conroe is of course problematical. As already indicated Conroe is not a boom oil town. It is an old settled community with oil-boom adjuncts. Nobody supposes anything else than that these adjuncts, especially those represented by crude shacks along the two approaches to the town already described, will in great measure fade out of the picture. Nobody supposes either that there will not be a residuum of healthy growth and well-being left after the fleeting features of the present stage have vanished.

Money Flowing Into Conroe

Money is flowing into Conroe. From A. R. Woodson, president of the First National Bank, it was ascertained that the deposits in that institution, which formerly ran around $300,000, now aggregate $700,000. This is largely lease and royalty money. All the new buildings are not cheap shacks. Substantial structures, including modern dwellings, are going up too; and it is reasonable to suppose there will be more of these as beneficiaries of the new oil field become accustomed to their easier circumstances.

Among differences between the old Conroe and the new is the fact that the old Conroe did not know the names of its streets or the numbers of its houses. The new does, or soon will, for street signs and house numbers are among improvements under way. Of course there always has been a map in the municipal building showing the names of all streets, but nobody took the trouble to examine that. Why should they? There are owners of business houses along the town's principal street today who will laughingly admit their inability to tell its name.

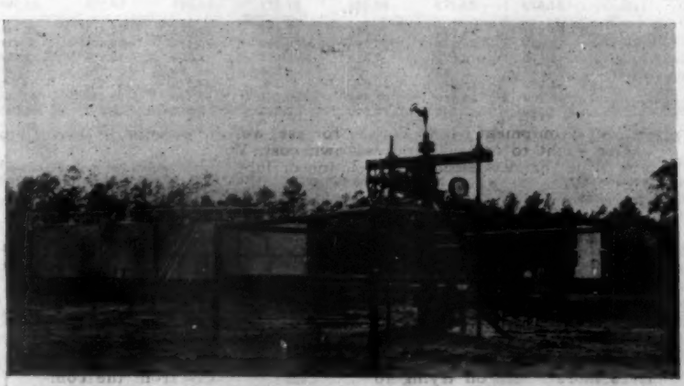
Chief Deputy Tax Assessor W. P. Terrell was telling how he recently found himself perplexed as a result of this universal inattention to the details of street address. "I met an old friend," said Mr. Terrell, "and he asked me to give him my address. I had to own up I didn't know what it was beyond the fact that it was Conroe. I looked the thing up later and found I lived at 204 Second Street."

Vice Touches Town Lightly

The vice and crime that infiltrate their way into new oil field towns have touched Conroe lightly. A large measure of the credit for this fact is accorded Sheriff G. H. Hooper and his chief deputy, G. C. Mostyn, who so far as possible have checked disorder, drunkenness and the activities of dissolute women wherever they appeared.

Dr. W. P. Ingrum, County health officer, said that from a medical standpoint conditions were not unsatisfactory. There had been an increase in venereal cases, which was to have been expected, but

(Continued on Page 30)



Strake discovery well in the Conroe Field, which has lightened financial problems of Conroe and Montgomery County

A. P. I. Economic Committee Estimates Offer a Six Months Operating Pattern for Industry

The statistical subcommittee of the American Petroleum Institute committee on refinery statistics and economics has prepared a forecast of the economic position of the industry with respect to crude and motor fuel for the period ending September 30, 1933. While the committee has not had the benefits of statistics from the Federal Oil Conservation Board, which is no longer active, it has followed the same analytical procedure which has been tested as to accuracy over previous periods.

The forecast, the committee says, "represents an assembly of figures which, if accepted and used as a pattern throughout the period stated, should result in an appreciable improvement in the position of the industry. Past studies and reports of the committee have not been accorded the importance which they have deserved, and, as a result, the benefits which could have been derived from them have in a large measure been lost. They should not be ignored. No single company within the industry is qualified to prepare a better statistical report than the one now presented. It sounds a definite warning and is worthy of serious study, not only by the industry but in any program for the industry which may be considered by the Federal and state governments."

TABLE 1—SUMMARY OF FORECAST OF DEMAND, ECONOMIC STOCKS AND REQUIRED SUPPLY

April 1, 1933, to September, 1933 (forecast), vs. April 1, 1932, to September, 1932 (actual)
(In thousands of barrels)

Motor Fuel (Details Table 2)

Item—	1933 Second quarter Total	1933 Second quarter change Per cent	1933 Third quarter Total	1933 Third quarter change Per cent	Six months Total	Six months change Per cent
DEMAND: Total	102,100	—7.3	109,700	—4.0	211,800	—5.6
Domestic	95,000	—3.3	103,000	—3.6	198,000	—3.4
Exports	7,100	—40.5	6,700	—10.2	13,800	—28.9
STOCKS: Change during period	—5,026	...	—10,830	...	—15,856	...
Beginning of period	60,556	...	55,530	...	60,556	...
End of period	55,530	...	44,700	...	44,700	...
SUPPLY: Total	97,074	—11.5	98,870	—0.4	195,944	—6.2
From imports	.....	...	.....	...	.....	...
From U. S. producers	97,074	—8.1	98,870	—0.2	195,944	—4.3
Straightrun and cracked	89,142	—7.5	90,990	+0.7	180,132	—3.5
Natural gasoline	7,652	—14.9	7,600	—9.8	15,252	—12.4
Benzol	280	—0.4	280	0.2	560	+7.9

Crude Oil

DEMAND: Total	214,240	—6.5	216,680	+1.8	431,020	—2.5
Export	7,200	—16.3	6,800	—5.6	14,000	—11.3
Domestic	207,140	—6.2	209,880	+2.0	417,020	—2.2
Runs to stills	203,340	—6.8	206,080	+1.7	409,420	—2.7
Used as such	1,500	+0.4	1,500	+4.2	3,000	+6.8
Transfers to fuel (Calif.)	2,300	+84.6	2,300	+42.9	4,600	+61.1
STOCKS: Beginning of period	341,708	...	.....	...	.....	...
End of period	.....	...	.....	...	.....	...
SUPPLY: Total required	214,240	—6.5	216,680	+1.8	431,020	—2.5
From imports	7,000	—60.1	7,000	—32.6	14,000	—46.2
From domestic production } From stocks }	See text for complete explanation.					

The committee on refinery statistics and economics is composed of D. J. Moran, chairman; A. J. Byles, C. L. Suhr, E. G. Seubert, E. B. Reeser, T. H. Barton, H. C. Wiess, T. A. Dines and K. R. Kingsbury.

The subcommittee which prepared the estimates consists of W. A. Sinsheimer, chairman; Fred Van Covern, secretary; W. S. Ackerman, W. C. Allen, O. S. Ambrose, W. B. Case, E. H. Griswold, L. E. Harmon, C. B. Mapes, A. J. McIntosh, E. P. Salisbury, J. M. Sands and S. A. Swensrud.

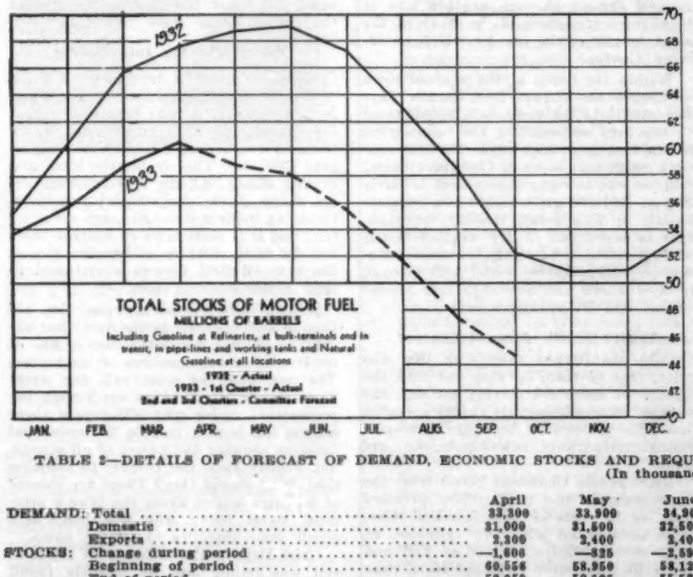
The subcommittee's report to Chairman Moran follows:

"In forecasting motor fuel demand and the economic motor fuel inventory level, the committee found its work to be incomplete without giving consideration to crude oil production and crude oil inventories. It was not felt that the report should delve into this situation, but the committee deems it pertinent to point out to you that it believes current crude oil production should be held at least 100,000 bbls. daily below current demand, and that approximately 18,000,000 bbls. should be withdrawn from storage during the six months.

"It is interesting, also, to note that in reaching economic motor fuel stock levels, no more gasoline need be withdrawn from storage between now and September than there was during the same period in 1932.

"On June 21, 1932, the Federal gasoline tax law became effective. For several weeks preceding, movement of motor

(Continued on Page 30)


1932
1933
TOTAL STOCKS OF MOTOR FUEL
MILLIONS OF BARRELS
Including Gasoline at Refineries, at bulk-terminals and in transit, in pipe-lines and working tanks and Natural Gasoline at all locations
1932 - Actual
1933 - 1st Quarter - Actual
2nd and 3rd Quarters - Committee Forecast
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

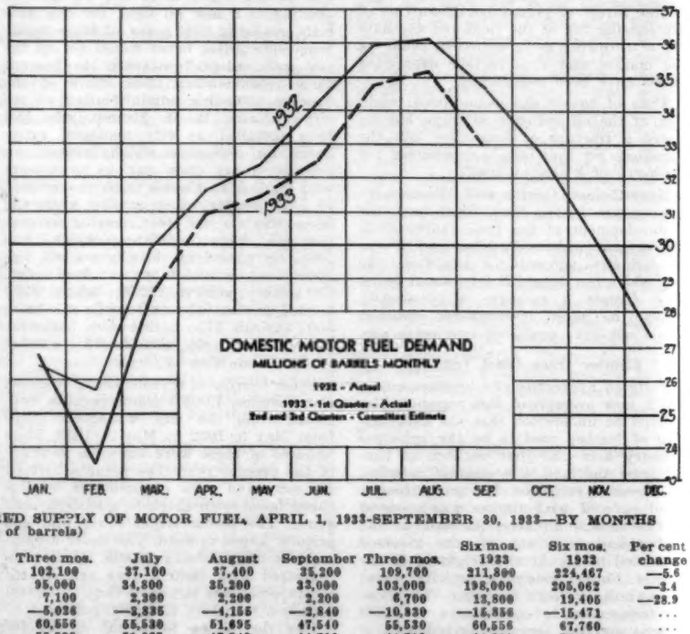

1932
1933
DOMESTIC MOTOR FUEL DEMAND
MILLIONS OF BARRELS MONTHLY
1932 - Actual
1933 - 1st Quarter - Actual
2nd and 3rd Quarters - Committee Estimate
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

TABLE 2—DETAILS OF FORECAST OF DEMAND, ECONOMIC STOCKS AND REQUIRED SUPPLY OF MOTOR FUEL, APRIL 1, 1933-SEPTEMBER 30, 1933—BY MONTHS
(In thousands of barrels)

	April	May	June	Three mos.	July	August	September	Three mos.	Six mos. 1933	Six mos. 1932	Per cent change
DEMAND: Total	33,300	33,900	34,900	102,100	37,100	37,400	35,200	109,700	211,800	224,467	—5.6
Domestic	31,000	31,500	32,500	95,000	34,300	35,200	32,000	103,000	198,000	205,062	—3.4
Exports	2,300	2,400	2,400	7,100	2,300	2,200	2,200	6,700	13,800	19,405	—28.9
STOCKS: Change during period	—1,606	—325	—2,595	—5,026	—3,335	—4,155	—2,840	—10,330	—15,856	—15,471	...
Beginning of period	60,556	58,950	58,125	60,556	55,530	51,695	47,540	55,530	60,556	67,760	...
End of period	58,950	58,125	55,530	55,530	51,695	47,540	44,700	44,700	44,700	52,289	...
SUPPLY: Total	31,694	33,075	32,305	97,074	33,365	33,245	33,360	98,870	195,944	208,996	...
From imports	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,325	—100.0
From U. S. producers	31,694	33,075	32,305	97,074	33,365	33,245	32,360	98,870	195,944	204,671	—4.3
Straightrun and cracked	29,032	30,410	29,700	89,142	30,620	30,690	29,680	90,990	180,132	186,735	—3.5
Natural gasoline	2,572	2,570	2,510	7,652	2,550	2,460	2,690	7,600	15,252	17,417	—12.4
Benzol	90	95	95	280	95	95	90	280	560	519	+7.9
Probable straightrun and cracked yield	43.5%	43.8%	44.2%	43.8%	44.1%	44.2%	44.2%	44.2%	44.0%	44.4%	...
Required crude runs to stills—Total	66,700	69,440	67,200	203,340	69,440	69,440	67,200	206,080	409,420	420,766	—2.7
Required crude runs to stills—Daily	2,300	2,240	2,240	2,235	2,240	2,240	2,240	2,237	2,260	2,322	—2.7

TABLE 3—CLASSIFICATION AND ALLOCATION OF ECONOMIC STOCKS OF MOTOR FUEL
(In thousands of barrels)

Month and year—	At refineries	At terminals, in transit and in pipe lines	Unblended natural gasoline at refineries at plants and blends at plants	Total motor fuel stocks
March 31, 1933	36,882	20,124	3,548	60,556
April 30, 1933	34,730	20,600	3,620	58,950
May 31, 1933	33,575	20,900	3,650	58,125
June 30, 1933	31,570	20,400	3,560	55,530
July 31, 1933	28,335	19,900	3,460	51,695
August 31, 1933	24,820	19,360	3,360	47,540
September 30, 1933	22,550	18,950	3,200	44,700

Month and year—	East Coast	Appalachian	Indiana, Illinois	Oklahoma, Kansas	Inland Texas	Texas Gulf	Louisiana Gulf	North Louisiana and Arkansas	Rocky Mountain	California	Total all districts
March 31, 1933	16,349	2,525	8,577	6,322	2,284	5,776	1,843	437	1,612	14,330	60,556
April 30, 1933	17,157	2,665	8,430	6,043	2,430	5,150	1,525	395	1,535	13,640	58,950
May 31, 1933	17,448	2,825	8,250	5,886	2,317	5,040	1,490	380	1,485	13,225	58,125
June 30, 1933	16,527	2,520	7,870	5,510	2,120	4,935	1,455	348	1,405	12,640	55,530
July 31, 1933	15,976	2,320	7,015	4,985	1,823	4,490	1,420	316	1,340	12,010	51,695
August 31, 1933	15,037	2,095	6,230	4,450	1,500	4,120	1,385	283	1,280	11,190	47,540
September 30, 1933	14,440	1,950	5,725	4,025	1,230	3,890	1,360	250	1,230	10,550	44,700

Note—All the above stocks figures are on a basis comparable with current Bureau of Mines reports.

Well Spacing, Proration and Production Practice Formed the Major Part of A. P. I. Program

By L. G. E. BIGNELL
Petroleum Engineering Editor

The third mid-year meeting of the American Petroleum Institute held in Tulsa this week was marked by a crystallization of thought on major topics discussed in the various meetings of the production division. Committee meetings held in advance of the technical sessions dealt largely with reports of work done by the members during the year. The technical sessions were divided into three meetings, one on well spacing held on Thursday and presided over by Fred E. Wood, Standard Oil Co. (Indiana), Chicago; one on drilling and production practice, Friday morning, presided over by H. N. Marsh, General Petroleum Corp. of California, Los Angeles, Calif.; and the other on proration and production practice Friday afternoon with W. K. Whiteford, Barnsdall Oil Co., Tulsa, in the chair.

The committee meetings handled a large number of reports on a wide range of subjects and clearly indicated that much detailed thought had been given to each of them. Correlation of work between the various committees is noticeable and starts with research work on source beds and accumulation of oil and continues through well spacing programs, drilling and production practice.

In committee the A.P.I. members represented a good cross section of the whole industry and discussed their problems from legal and technical angles with attention to details which give a clear indication of the progress made. The reports made to the executive committee of the A.P.I. from these various subcommittees were all encouraging. Lack of funds to continue important research work is regretted, but by concentrating upon important work that is nearly completed it is hoped sufficient money will be made available to secure final reports.

Through all the meetings and in discussions in the hotel lobby and on the street ran the general topic of East Texas oil field conditions. The future of this field will have a direct bearing upon many details of procedure in all departments of the industry and especially in the production division. It was suggested that the petroleum engineer should now devote more of his time to actual field work to increase efficiency of operations and recovery of oil and allow legal matters to be handled by attorneys.

The future work of the committees will be largely devoted to reducing to concrete recommendations practices to be followed by the production division.

Well Spacing

In committee and in the technical session held Thursday morning well spacing came in for a great deal of detailed discussion. It is of importance in future development because many of the ills of the industry are now traced directly to unrestricted drilling in many fields.

Such a drilling program as East Texas indulged in can lead only to similar conditions in the future. Under a competitive drilling program every well owner is anxious to produce all the oil possible from each well and where close drilling programs have been practiced excessive drainage has taken place and overproduction of oil has been inevitable.

The industry now knows that each pool has certain well-defined characteristics and past experience has indicated clearly that good drilling and production practices should be followed. The vast majority of operators is in accord on the general principles of development and production, but cannot follow their desires in orderly application of good methods because of the willful disregard to basic production and economic principles by a few owners of small interests in each field.

The first paper on the well-spacing program was presented by T. V. Moore, R. J. Schilthuis and William Hurst, Humble Oil & Refining Co., Houston, Tex., on "The Determination of Permeability from Field Data." It is printed elsewhere in this issue of The Oil and Gas Journal.

Permeability of an oil-bearing formation is that quality that directly influences the ability of the reservoir to give up its oil and gas to the wells. It is subject to wide variations within comparatively short distances in the pool and studying samples secured from well bores only give partial results because the samples secured represent very small portions of the total area under consideration.

The authors of this paper believe that the application of certain well-known formulas to a study of the underground conditions as made known by test flowing conditions of the wells in the pool will give more accurate results for compiling permeability statistics than is possible by laboratory work. The value of laboratory research work is not discounted, but past practice has clearly indicated that a well's open flow characteristics are suitable to use to judge its future performance.

However, under conditions of production limited to market demand rather than the field's capacity to produce there are few opportunities presented from which open flow data can be secured. It must therefore be computed from short test flow data and interpreted into terms of regulated flow conditions.

Fred E. Wood, Standard Oil Co. (Indiana), presented the second paper of the Thursday morning program on "A First Approximation of the Relation Between Well Spacing and Ultimate Recovery." The conclusions and recommendations made are based upon many years of study of this important subject. They also embody much data presented in the topical committee on well spacing of the A.P.I. meetings, of which committee Mr. Wood is chairman. It did not, however, constitute a report of this committee's findings.

Mr. Wood suggested a spacing of one well to 40 acres for the gas type drive pools. The well to be located in the exact center of the tract so that all drainage will be radially toward this point from the lease limits. Within any 40-acre tract there is a given amount of energy and by placing the well in the center of this tract this energy will be converted to the work of driving the oil and gas toward the well in a series of radial movements. With four wells for the 40-acre lease the energy within the formation would be required to move in four sets of radial lines and this would tend to break up continuity of direction of flow and also divide energy.

For fields with the water type drive or fields with a combination of water and gas drive the location of the well would have to be modified and so placed that it would intercept the path of the movement of the oil and gas in the formation.

The plan offers many possibilities and some estimates of recovery presented by Mr. Wood indicate that of the total amount of oil about 70 per cent might be recovered by the plan of spacing one well to 40 acres, as compared with close spacing. After the first well had been produced to approximate depletion other wells could probably be drilled to recover additional oil and it is reasonable to assume the delayed drilling might be profitable because of a changed market price for the oil and the demand.

Dr. Parker D. Trask, U. S. Geological Survey, Washington, D. C., gave a very interesting report upon his work on the American Petroleum Institute research project on "Origin and Environment of Source Sediments." Doctor Trask has spent seven years in this work and has accumulated a vast fund of information which has been published in book form. The laboratory work will be continued by Doctor Trask after July 1, but because the fund is depleted no more field work is contemplated at this time.

Dr. Russell S. Knappen, Gypsy Oil Co., Tulsa, gave a concise review of Doctor Trask's work as applied to the oil fields at the end of his address.

Drilling and Production Practice

Hallan N. Marsh, General Petroleum Corp. of California, Los Angeles, Calif., presided over this session and the first paper was by M. P. O'Brien and J. E. Gosline, University of California, Berkeley, Calif., and is printed in this issue of The Oil and Gas Journal.

The next two papers were reports by the U. S. Bureau of Mines engineers who made a study of subsurface conditions in the East Texas Field this spring. The first paper was presented by Ben E. Lindley, senior petroleum engineer, U. S. Bureau of Mines, Bartlesville, Okla., and covered bottom hole samples of East Texas crude oil, and the second was presented by C. E. Riestle, Jr., and E. P. Hayes served as co-author. It was on subsurface pressures and temperatures in flowing wells in the East Texas Field.

These papers are most enlightening and require careful reading and study to be fully appreciated. They will be published in this and next week's issue of The Oil and Gas Journal in their entirety. Discussion will not be attempted here but it is desired to call attention to the fact that this work was done during a period when the field's daily production rate was about 350,000 bbls. It now exceeds a million barrels per day, and while the fundamental facts developed by this very careful study are unchanged the application of the data to conditions now existing in that field must be modified.

The water drive is the effective means of repressuring the producing formations in East Texas and at the pressures existing in the wells under the modified rate of withdrawal it was effective. With the rate of withdrawal increased from 350,000 to over a million barrels daily, bottom hole pressures have dropped much faster and this is very conclusive evidence that the oil and gas are being taken from the field at higher rates than the water is moving into the depleted portions of the reservoir.

Proration and Production Practice

Proration of both oil and labor was discussed at the Friday afternoon session of the Production Division presided over by William K. Whiteford, vice president of the Barnsdall Oil Co., Tulsa, and two excellent papers were presented on these subjects. The third paper on the program was on "Corrosion of Oil Well Tubing" by W. F. Rogers, Gulf Oil Cos., and is printed in this issue of The Oil and Gas Journal.

E. H. Griswold, Continental Oil Co., New York, presented the first paper on proration under the title, "Economic Benefits of Proration," and very clearly traced cause and effect of proration practices and the results as reflected in prices of crude oil since 1926 when proration was first put into effect on a large scale in this country.

Those who have maintained that pro-

(Continued on Page 84)

Rockefeller Offices Leave 26 Broadway for New Quarters in R.C.A. Building

NEW YORK, May 22.—The building at 26 Broadway will lose its most famous tenants early in July, when John D. Rockefeller, Sr., John D. Rockefeller, Jr., and their personal staffs will move to the fifty-sixth floor of the seventy-story RCA Building, the main unit in Rockefeller Center.

The change will mark the first transfer of the Rockefellers' business headquarters in half a century. At the offices of Rockefeller Center it was explained that the change affected on the personal organization and office staff of the Rockefellers and did not concern the Standard Oil Co. of New York and other Rockefeller concerns with headquarters in the Broadway Building.

Already the General Education Board, the Rockefeller Foundation and the Spelman Fund, which are supported by Rockefeller benefactions, have leased quarters in the RCA Building.

The new Rockefeller offices take up about three-quarters of the floor in the downtown skyscraper, and John D. Rockefeller, Jr.'s office will be at the southwest corner, overlooking Forty-ninth Street and Sixth Avenue. The space to be vacated consists of the entire twentieth floor and half of the twenty-eighth in the Broadway Building. Some space will be retained there, however, for downtown conferences. The new location is convenient to the town houses of the Rockefellers which are in West Fifty-fourth Street just off Fifth Avenue.

The offices of John D. Rockefeller, Jr., have been in 26 Broadway since he first entered business in 1897. His father has been at that address for 50 years, moving into a small building on the site in the early eighties, after several years in Pearl Street. Later other sections were added to the building and its height increased. About 10 years ago the present structure was erected. The Standard Oil Co. of New York owns the building.

Study and Application of Subsurface Pressures and Temperatures in East Texas Flowing Wells

By C. E. REISTLE, Jr.[1] and E. P. HAYES[2*]

The tests reported in this paper were made in the East Texas Field in the summer and fall of 1932 as a part of the Bureau of Mines study of the operation of flowing wells and reservoir performance; and to determine, if possible, the minimum reservoir pressure necessary to produce the wells in this field by natural flow through different sizes of flow strings. The minimum reservoir pressure that would be required to maintain natural flow through 2½-inch tubing was determined experimentally for the existing energy conditions in the East Texas Field. With the present available data, however, it is impossible to predict accurately or to determine by calculation the necessary energy requirements for maintaining the vertical flow of oil and gas mixtures under all conditions. Although some valuable data were obtained which seem to have application to the solution of problems involving vertical flow, this important research of the petroleum industry is so involved that more study of the complicating factors influencing the flow of oil-gax mixtures through vertical pipes is required.

Veraluys has presented a mathematical analysis of the vertical flow of oil and gas mixtures which covers the fundamental theories of the problem—although, as he points out, there are factors, particularly friction, slippage, and solubility of the gas in the oil that must be known or determined experimentally before the equations he has developed can be applied to actual problems. Moore and Wilde determined experimentally the amount and character of gas slippage in the vertical flow of gas and oil mixtures under certain conditions, and Moore and Schilthuis, using this experimental data, developed a method for the calculation of pressure drops in flow strings. They have found, however, that this method will prove satisfactory only within certain specified limits. One of these limits is that the exit pressure of the flow string must be greater than 100 pounds per square inch. The method, therefore, cannot be used for determining the minimum reservoir pressure that will be necessary to maintain natural flow through different sizes of flow strings.

TABLE 1

Company and well—	Flow string	Sand record, feet
Sun Oil Co., Schuler joint "B" lease, Well 3 Jauna B. D. Codene Survey	3,646 feet of 2-in. upset 10 feet of 2-in. perforated, closed on end	Poor sand recovery from core drilling. Top of Woodbine, 3,605 Casing set Bottom of Woodbine, 3,635 Total depth, 3,665
Sinclair Prairie Oil Co., W. H. York lease, Well 1 M. Dillard Survey	3,561 feet of 2½-in. upset One joint perforated, closed on end	Sandy shale, 3,559—12 Oil sand, 3,560—1 cored Oil sand, 3,562—8 Gummy shale, 3,569—7 Sand, 3,570—1 Oil sand, 3,576—6 cored Top of Woodbine, 3,570 Total depth, 3,576
Shell Petroleum Corp., P. M. Bates lease, Well 3 M. Van Winkle Survey	3,616 feet of 2¼-in. tubing	Hard sandy shale, 3,560—2 Top of sand, 3,560 Oil sand, 3,562—8 Coarse sand, 3,578—10 Fine sand, 3,583—5 Fine sand, 3,593—10 Coarse sand, 3,603—10 Medium coarse sand, 3,603—5 Fine sand, 3,614—6 Sandy shale, 3,619—5 Woodbine sand, 3,560-3,614 Total depth, 3,619
Barnsdall Oil Co., G. E. Adams lease, Well 1 G. W. Hooper Survey	2,771 feet of 3-in. upset 849 feet to 5-in. of 2½-in. upset Total tubing, 3,620 ft. to 5-in.	Top of Woodbine, 3,598 Total depth, 3,659
Shell Petroleum Corp., M. H. Bivins "B" lease, Well 1 Wm. P. Chism Survey	3,670 ft. of 2-in. tubing	Chalk, 3,660—2 Medium hard sandy shale, 3,-665—5 Hard sand fossil casts, 3,667—2 Oil sand, 3,674—7 Top of producing sand, 3,667 Total depth, 3,674

Two distinct systems are involved in the operation and control of a producing oil well: the flow string or lift system and the reservoir system. These two systems are connected and interrelated, and the performance of one cannot be controlled without at the same time affecting the operating conditions of the other. In order to determine the minimum reservoir pressure that will be required to maintain natural flowing conditions, it is necessary not only to determine the energy or pressure required to lift the oil through different-sized flow strings but also to know the performance of the reservoir under different pressure conditions.

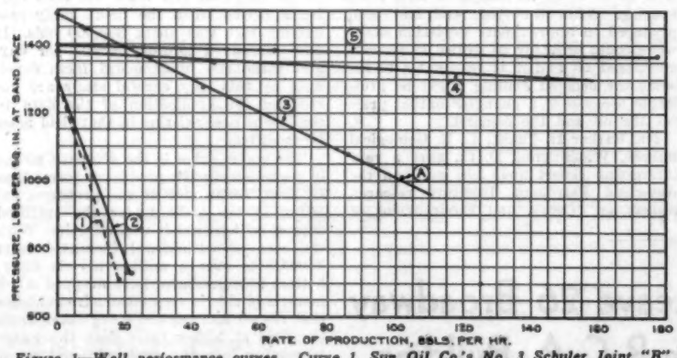


Figure 1—Well performance curves. Curve 1, Sun Oil Co.'s No. 3 Schuler Joint "B" lease, well open 27½ hours. Curve 2, Sun Oil Co.'s No. 3 Schuler Joint "B" lease, well open 5 hours. Curve 3, Sinclair Prairie Oil Co.'s No. 1 W. H. York, well open short period. Curve 4, Shell Petroleum Corp.'s No. 3 P. M. Bates. Curve 5, Barnsdall Oil Co.'s No. 1 G. E. Adams

Part 1—Sand Performance

The Woodbine formation is the producing sand of the East Texas Field. The thickness and physical characteristics of this formation vary to some extent in various parts of the field, but it is remarkably uniform for a field of this size. There seems to be no doubt that the pore spaces of the sand within the productive limits of the field at the time of discovery were completely filled with oil in an unsaturated condition such that no gas could be liberated from solution until the pressure of the oil was reduced to 755 pounds per square inch absolute at reservoir-sand temperatures. Apparently, no free gas existed in the formation at the time the field was discovered. Outside the producing area, to the north, west and south, the Woodbine sand is saturated with water under the normal pressure to be expected at that depth. The east side of the field is bounded by a well-defined fault.

In making a study of the sand performance, wells were selected throughout the field which would be, to some extent, representative of the different sand conditions encountered in the field. The sand records of the test wells are given in Table 1.

The test wells were produced at different rates of production for a sufficient length of time so that equilibrium conditions were established within the sand reservoir for each rate of production. A continuous pressure and temperature record was obtained at the face of the sand with the Bureau of Mines recording gauge, and the gas and oil production was carefully measured at the surface. The results of these tests are shown in Figure 1.

It was found in all the wells tested that the rate of production was a linear function of the pressure at the face of the sand. Laboratory tests by Uren have indicated that for liquids alone the quantity of liquid flowing through porous media is directly proportional to the dif-

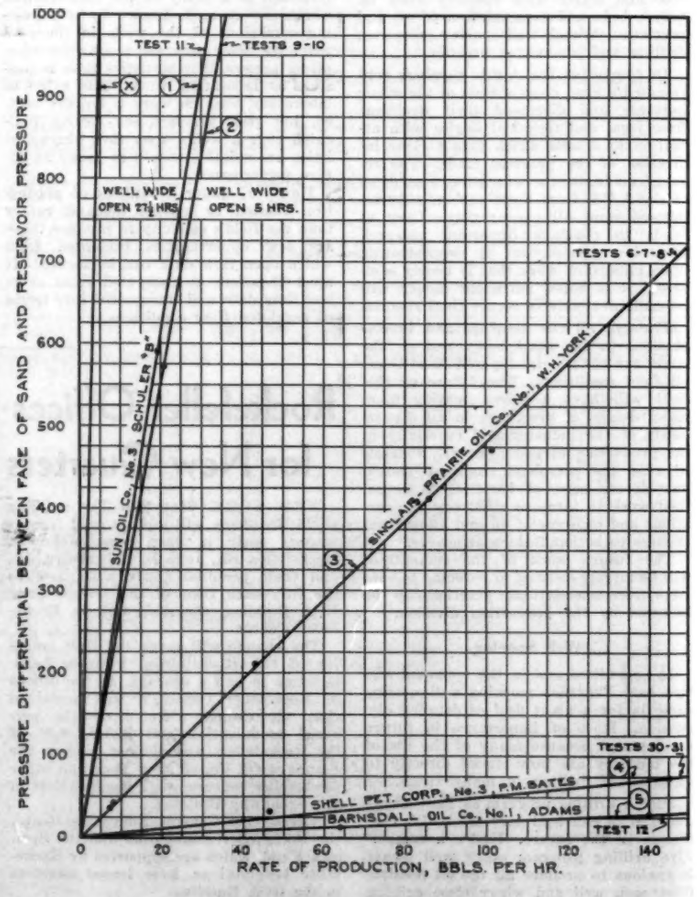


Figure 2—Potential production curves

*From U. S. Bureau of Mines Report of Investigations 3,211. Read before A.P.I., Division of Production, Tulsa, May, 1933.

[1]Petroleum engineer, U. S. Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.

[2]Associate gas engineer, U. S. Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.

Authors' title is "A Study of Subsurface Pressures and Temperatures in Flowing Wells in the East Texas Field and the Application of These Data to Reservoir and Vertical-Flow Problems."

14.250 cents a barrel

For every barrel of Dubbs cracked gasoline he makes, one refiner is putting into his pocket 14.250 cents that it formerly cost him to treat it

He's using Universal Liquid Inhibitor —that's the reason

Universal Inhibitor keeps the anti-knock value all in and the gum all out

It costs only a trifle (still less to Dubbs refiners) but its value is 14.250 cents a barrel to this one Dubbs licensee and it is making notable savings for all refiners who use it

It pays to be a Dubbs licensee—figure it out for yourself

Universal Oil Products Co
Chicago Illinois

Dubbs Cracking Process
Owner and Licensor

ferential pressure, and Chalmers has pointed out, in discussing Uren's data, that the flow of liquids through porous media conforms with the conditions expressed by Poiseuille's Law. Theoretically this would hold true, only if the flow were steady, but this type of flow does not obtain in the performance of a natural reservoir. A simple expression of Poiseuille's Law for radial flow may be written as follows:

$$\Delta P = K\,Q \log_e \frac{R}{\sqrt{}}$$

Where

ΔP = Pressure drop between any two points in the sand body,
K = A constant for the sand and liquid,
Q = Rate of flow,
R = Distance from axis of well to point farthest removed from well,
$\sqrt{}$ = Distance from axis of well to nearest point.

The slope of the well performance curves in Figure 1 are, therefore, a function of the sand and of the liquid flowing to the well. Perhaps for practical purposes, the slope can be considered to be a function of the permeability of the sand, its thickness and the viscosity of the oil. These curves in Figure 1 can be drawn as shown in Figure 2 where the abscissae are the rates of production and the ordinates the difference in pressure between the pressure at the face of the sand and the closed-in or reservoir pressure. Assuming that the drainage radius of these wells will not change as the reservoir pressure declines, the rate of production of the wells will remain constant for the same difference in pressure between the reservoir pressure and pressure at the face of the sand, regardless of the decline in reservoir pressure, so long as the reservoir pressure is above that pressure at which gas is liberated from solution in the oil. This statement is based upon the following conditions: (1) that the face of the sand, well opening or liner, will not become clogged or filled with loose sand or other material, and (2) that the viscosity of the oil will not change. Before the theoretical and actual conditions can be correlated and well performance predicted for reservoir pressures below 755 pounds per square inch, additional field tests will be necessary to determine the relationship between pressure conditions and the rate of production when gas is liberated from solution from the oil while in the sand.

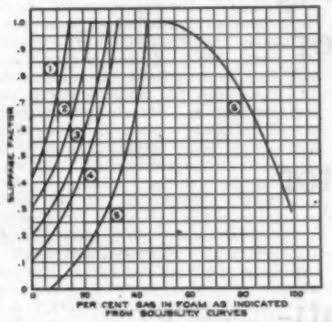


Figure 3—"Slippage factor" for East Texas conditions. (1) Linear velocity of foam, 3 ft. per sec.; (2) linear velocity of foam, 2 ft. per sec.; (3) linear velocity of foam, 1 ft. per sec.; (4) linear velocity of foam, .5 ft. per sec.; (5) linear velocity of foam, .3 ft. per sec.; (6) linear velocity of foam, 10 to 15 ft. for mist flow

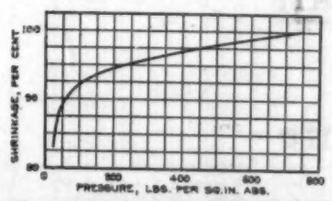


Figure 4—Volume of liquid remaining when unit volume of gas in oil solution is expanded by differential liberation at 146° F. from 755 pounds per square inch absolute. Calculated from data supplied by B. E. Lindsly

If the rate of production is divided by the thickness of the sand exposed in the well and these results are plotted against the corresponding pressure differentials between the reservoir and sand face, the slope of the curves can be used as a relative figure for the permeability of the sand surrounding each individual well.

Using the curves in Figure 2, the production of the wells can be predicted for any given pressure at the face of the sand and any reservoir pressure above 755 pounds per square inch absolute. For example, the Sinclair Prairie well, Curve 3, Figure 2, would produce 42 bbls. an hour, with a difference in pressure of 200 pounds per square inch between the pressure at the face of the sand and the reservoir pressure. Application of these data are of importance in estimating the natural flowing life of individual wells.

Part 2—Vertical Flow Problem

The vertical flow of oil and gas mixtures in natural flowing wells is the result of the positive work of pressure exerted at the bottom of the well and the positive work produced by expansion of the gas associated with the oil as it moves to a region of lower pressure. This positive work must overcome the negative work of gravity, friction, acceleration, and slippage of the gas through the associated oil. If the positive work is equal to or greater than that necessary to overcome the negative work the well will flow. A mathematical evaluation of these various forms of positive and negative work has been presented by Versluys. Moore, Wilde and Schilthuis have experimentally determined the energy losses due to slippage and have developed a method for calculating the pressure drop in flow strings under conditions where there is free gas produced in addition to the gas in solution in the oil.

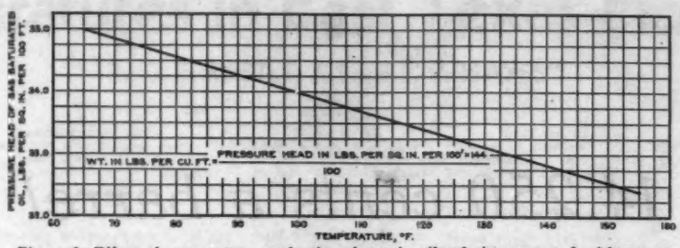

PRESSURE HEAD OF GAS SATURATED OIL, LBS. PER SQ. IN. PER 100 FT.
WT. IN LBS. PER CU. FT. × PRESSURE HEAD IN LBS. PER SQ. IN. PER 100' = 144
100
TEMPERATURE, °F.

Figure 5—Effect of temperature on density of gas in oil solution saturated with gas at 755 pounds per square inch absolute, and 146° F. Note—No correction for compressibility of liquid

The tests in East Texas were conducted to determine, if possible, the minimum reservoir pressure conditions that would sustain natural flow and to obtain additional data on the effect of slippage, friction, and acceleration on the vertical flow of oil and gas mixtures.

In order to dissipate the reservoir pressure without altering the quantity of gas associated and produced with the oil, different sizes of Otis removable chokes were used in the bottom of the flow strings. This would not be practical in fields where free gas entered the well with the oil as under that condition, the use of bottom hole chokes would change the amount of gas produced with the oil. In East Texas, however, it is believed that the tests have duplicated the conditions that will occur as the reservoir pressure declines to 755 pounds per square inch absolute. When the reservoir pressure declines below 755 pounds per square inch it is unlikely that the gas liberated from solution in the oil while in the reservoir will be produced in the same ratio of gas to oil as now exists and different energy relationships therefore will prevail.

The well selected for a majority of the tests was one where the surrounding producing formation was very permeable and a high rate of production could be obtained without reducing the pressure at the face of the sand appreciably. Chokes of different sizes were used to dissipate the reservoir pressure and obtain different pressures at the bottom of the flow string. The pressure and temperatures at different points in the flow string were measured by use of the Bureau of Mines recording pressure and temperature gauge.

Foam Flow

While there is undoubtedly some error in the pressure measurements taken in the flow string while the well is flowing due to restriction in the pipe by the instrument, it is felt that the data are sufficiently accurate to closely approximate the conditions prevailing in the flow string. Results obtained from the tests indicate the existence of two definite types of flowing conditions, with possibily a third or transition condition. The first form of flow, foam flow, was observed to prevail where the volume ratio of gas to oil in the flow string was less than 1.

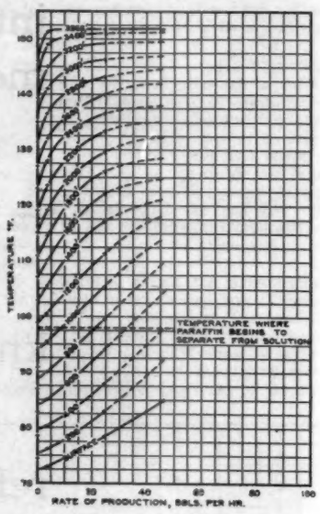


Figure 6—Rate of production-temperature curves for 3,570 feet of 2-inch tubing with choke. East Texas tests Nos. 33, 34 and 35. Shell Petroleum Corp.'s No. 1-B W. H. Bivins

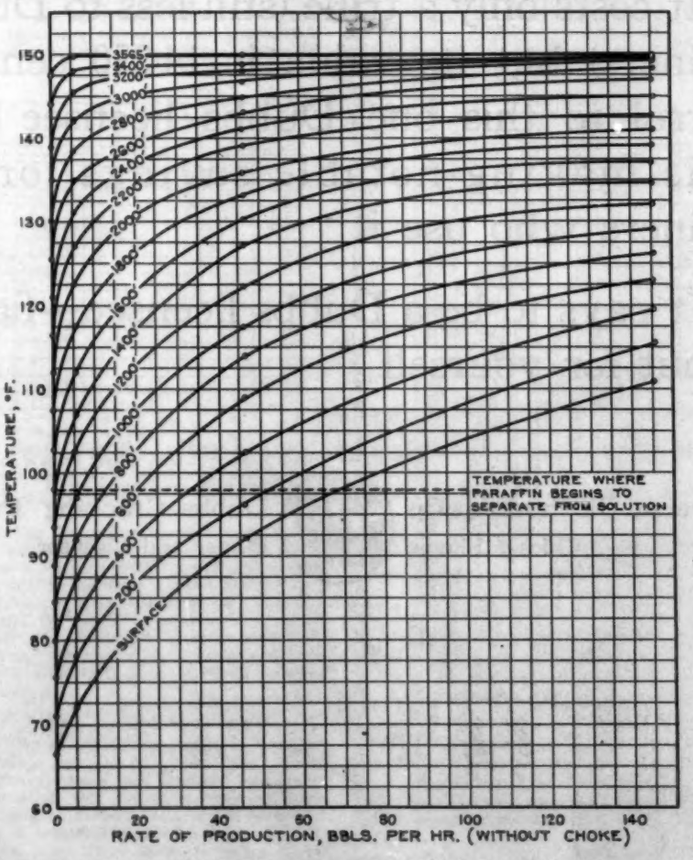

TEMPERATURE, °F.
TEMPERATURE WHERE PARAFFIN BEGINS TO SEPARATE FROM SOLUTION
SURFACE
RATE OF PRODUCTION, BBLS. PER HR. (WITHOUT CHOKE)

Figure 7—Rate of production-temperature curves for 3,616 feet of 2¾-inch tubing without choke. East Texas tests Nos. 17, 23, 26 and 27. Shell Petroleum Corp.'s No. 3 P. M. Bates

Under these conditions the oil is the outside phase and there is slippage of the gas bubbles through the oil. The relative linear velocity of the gas and oil under these conditions is small. As the volume ratio of gas to oil approaches 1 the mixture tends to form a stable foam wherein the linear velocity of the gas and oil are the same and no slippage occurs.

Since the fraction of total useful energy that is lost in slippage can be shown to be equivalent to the relative linear velocity of the gas and oil divided by the relative linear velocity of the gas and oil plus the linear velocity of the oil, it is apparent that as the linear velocity of the oil and gas mixture increases, the slippage loss decreases.

This results in a condition wherein the slippage losses not only decrease, as the ratio of the gas to oil increases to the point where a stable foam is formed, but also decrease as the linear velocity increases. Figure 3 shows the "slippage factor" as calculated from the tests plotted against per cent gas in the oil-gas mixture for different linear velocities of the oil and gas mixture. To obtain an expression of the fraction of total energy

(Continued on Page 38)

LICENSES granted under United States and Foreign Patents for: Cross • de Florez • Holmes-Manley • Tube and Tank Cracking Processes and Combination Cracking Units.

Licensing Agents:
The M. W. KELLOGG CO.
225 Broadway · New York
or its
European Representative:
Compagnie Technique des Petroles · 134 Boulevard Haussmann · Paris, France

CRACKING PROCESSES

Successful cracking processes are the outgrowth of comprehensive research and practical development.

Experiments in miniature, in glass, in the laboratory, test runs in pilot plants and finally the coordination and study of results secured from installations throughout the world determine the most efficient process.

Under the broad licensing rights of Gasoline Products Company, combination units may employ any or all of the outstanding features of the four major cracking processes offered by this organization. Special design features may thus be incorporated to meet a particular problem of the individual refiner.

Before you make a decision involving investment in cracking equipment, we invite you to confer with us regarding the latest developments in pyrolytic cracking.

GASOLINE PRODUCTS COMPANY
INCORPORATED
11 COMMERCE STREET NEWARK, N. J.

GASOLINE PRODUCTS CO. INC.

PATENT OFFICES
405 LEXINGTON AVE., NEW YORK

World's Fair, Which Opens Saturday, Will Have Complete and Active Oil Industry Exhibit

The petroleum industry is especially interested in the Century of Progress International Exposition which opens in Chicago next Saturday. It will be essentially an animated or "process" portrayal of man's achievements during the past 100 years. The petroleum industry recognized in this exposition an ideal opportunity to present a complete story of oil operations. Moreover, it was found that by meeting certain high standards the portrayal would later be given permanent space in the Museum of Science and Industry in Chicago.

Accordingly, a committee of directors of the American Petroleum Institute was appointed, which investigated and recommended participation by member companies in both these endeavors, under auspices of the Institute. This committee functioned further to the extent of financing the cost by securing subscriptions of various oil companies and supervised the making of the plans for the exhibit. When completed, the exhibit will represent an investment of approximately $150,000.

Covers Full Industry

Over 6,000 square feet of free space in the Hall of Science at the "World's Fair" was allotted this presentation, which covers the full range of oil operations as follows: (1) Geological—aerial, exploration and mapping; (2) geophysical surveying; (3) deep drilling, subsurface geology and allied subjects; (4) production, transportation and storage; (5) refining. Every phase of this presentation will be completed on the opening day.

The committee has no hesitancy in stating that this is the most comprehensive view of petroleum operations which either the public or the industry itself has ever had the opportunity to observe. A model refinery, built almost entirely of glass and covering 300 square feet of space, will make it possible for visitors actually to observe what occurs inside fractionating and treating towers, how dewaxing is accomplished and other major refining processes, including cracking. This is a functioning plant—not a mere display of inactive equipment. In the 10-foot distillation columns, four fractions will be taken off: gasoline, kerosene, gas oil and lubricating oil; a heavy residue will also be collected. A mechanical voice will explain operations as they occur and the units discussed will be automatically lighted. Both audition and illumination will be synchronized with the functioning of the refinery.

Many Dioramas

Visitors will see many dioramas in the various exhibits at the fair. Those designed and constructed for the petroleum exhibit are achievements in this type of depiction and several of them have their model parts in action. An especially fine one is 18 feet wide and 12 feet high. It presents a modern oil field with its wells in drilling action, the sky overhead stretching away to the distant horizon, and the underground formations pierced with transparent tubing to the depth of the oil sands. Various drilling wells will bring in oil, salt water and gas. The sealing off of the oil by a fault is shown and the migratory nature of oil is explained. The surface has complete oil field equipment in miniature. The operations in this exhibit are also clarified by synchronized voice and spot illumination.

Operating Conditions

Some conception of the thorough manner in which action has been introduced to reproduce operating conditions may be had from these facts: 79 motors are used, 43 pumps, 7 air compressors, 4 sound mechanisms, 4 synchronized lighting devices, and 2 scenic projectors. Most of this equipment is entirely concealed along with by-pass tubing, chains, cogs, wires, etc., but the effects produced by this hidden apparatus are almost unbelievable.

Other exhibits of particular interest include a dramatic portrayal of the Turner Valley Field of Alberta. Geologists will be especially interested in the reproduction of the complexly faulted subsurface structure.

A model airplane, flying just beneath "the clouds," will be busily photographing the landscape below for geological mapping.

The drilling equipment might well represent an achievement in watch-making. Diamond, rotary and cable-tool equipment is displayed. The cable-tool derrick is about 8 feet high, the rotary about 13 feet, and both are animated under their own power. All equipment in these huge miniatures is exactly to scale.

Miniature Exhibits

One may watch miniature tools drilling underground, by means of cutouts, in a subsurface exhibit 20 feet long and 15 feet high. Another exhibit will show water introduced under pressure into the oil sand of apparently depleted fields, and how it drives additional oil to designated wells, from which it is pumped to the surface.

An especially interesting technical exhibit will deal with the application of geophysical instruments to the problems of the geologist.

A pumping oil field with central power plants in operation will show both the surface and subsurface. The interwoven nature of rail, water and pipe line transportation is demonstrated in a beautiful model of a typical terminal. Facilities include a 9½-foot model ocean tanker, docks, warehouses, loading racks with locomotive and tank cars, trucks, pumping station, storage tanks and auxiliary structures. A number of subjects which were more adapted to pictorial presentation, such as petroleum geography, history, unusual oil scenes, and "high-spot" statistics are presented as transparencies or "plane" exhibits.

—Copyright, Chicago Aerial Survey Co.

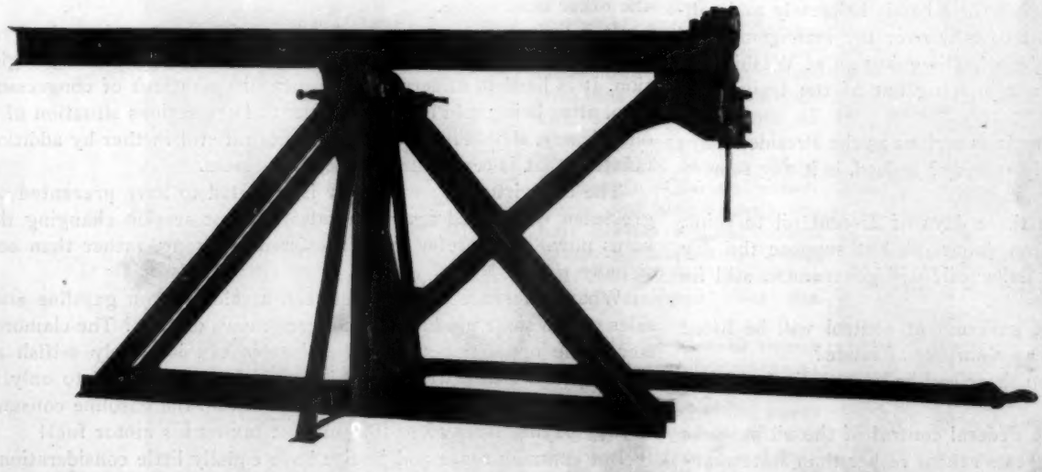
Bird's eye view of A Century of Progress, Chicago's 1933 World's Fair—with the soaring towers of Chicago in the background.

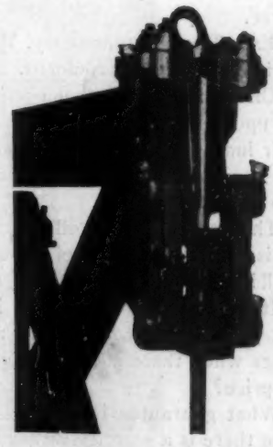
NATIONAL PUMPING JACKS

TYPE D-100 & D-130

All-steel, arc-welded construction, and designed for long-stroke pumping of deep wells. Entirely self-contained and self-supporting; with excess strength and extreme rigidity, these National Jacks provide economical installation, efficient operation and long, dependable service.

Bulletin No. 1032-B free on request.





THE NATIONAL SUPPLY COMPANIES

THE OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPELINE MARKETING

Published Weekly by

THE PETROLEUM PUBLISHING COMPANY

114-16 West Second Street, Tulsa, Oklahoma

P. C. LAUINGER, President

JOHN M. EGAN, General Manager

JAMES McINTYRE, Editor

ANDREW M. ROWLEY, Managing Editor

W. T. ANDERSON, Associate Editor

C. O. WILLSON, Refinery Editor

Established 1910 by PATRICK C. BOYLE

E. KLAPPENBACH, Advertising Manager

L. G. E. BIGNELL, Petroleum Engr. Editor

C. K. FRANCIS, Ph.D., Technical Editor

W. T. ZIEGENHAIN, Associate Editor

THOMAS F. SMILEY, Associate Editor

M. F. BALDWIN, Circulation Manager

Branch Editorial Offices

CANADA, Victor Lauriston — HOUSTON, Neil Williams — SAN ANTONIO, B. D. Stevenson
CHICAGO, Robert C. Conine — LOS ANGELES, L. P. Stockman — SHREVEPORT, D. H. Bancroft
DENVER, Tolbert R. Ingram — NEW YORK, A. E. Mockler — TOLEDO, George A. Whitney
FT. WORTH, L. E. Bredberg — OIL CITY, Leon H. Walter — WASHINGTON, C. E. Kern

Branch Advertising Offices

NEW YORK CITY, C. L. Cain — CHICAGO, C. R. Farmer — CLEVELAND, Howard Markt
LOS ANGELES, J. H. Tinkham

(For representatives' complete addresses, see contents page)

Member, Audit Bureau of Circulations

Warning From Washington

Last week the oil industry was worrying about East Texas. This week it is worrying about Congress. Of the two, Congress is the worse.

East Texas is temporary. What Congress fastens upon the industry is likely to be permanent. Political control has a bulldog grip.

Oil men who have been wringing their hands helplessly and calling upon the Federal Government to take over the management of their industry should be warned by what is going on at Washington and consider whether they are not jumping out of the frying pan into the fire.

The situation in the oil industry is as serious as the President says but is government control the only remedy? Indeed, is it any remedy at all? Ask the railroads.

It may seem fine to some in these days of 25-cent oil to think that government control will mean dollar oil, but suppose the day comes when there is not enough dollar oil; will government still fix the price?

What guarantee is there that government control will be lifted when there is a scarcity rather than a surplus of crude?

Of the two bills at Washington there can be no question which is the least dangerous.

The bill to establish a separate Federal control of the oil business is so extremely radical that it suggests rancor rather than statesmanship. It does not stop at regulation. It would turn over the whole management of the business to the Government, from telling a man how much he could produce to telling him how little he could get for it.

Doubtless many of the aims sought are excellent, but oil men should ask themselves if this is the way to attain them, whether there is not some more sensible way by which the same desirable purposes can be realized without turning the entire business over to official receivers.

Assuming that for good or ill Congress is going to pass one bill or the other the industry should ask that it be the industry recovery bill, dealing with all industries, and not a single bill establishing an oil dictatorship.

The recovery bill, on its face, would give each industry an opportunity to solve its own problems through self-government. What compulsion is prescribed would be exerted against obstructive minorities thwarting the public interest.

The recovery bill does not go into the detail of the dictatorship bill, presumably leaving details for recommendation and action by the industrial association, and in the case of oil this would be infinitely preferable to the enactment of radical regulations imposed by act of Congress and enforced by a "czar."

No stretch of the imagination requires a Federal dictator to determine the prices at which refined products should be sold to the public, any more than a Federal dictator should be named to fix the price of shoes.

The elimination of unfair competitive practices will take care of price-cutting and assurance of fair competition will guarantee a supply at fair prices. There will be no need for official minimum and maximum prices being fixed; no necessity for government management.

Government permission for co-operative action among trade groups in dealing with industrial problems will give the oil industry for the first time opportunity to put its house in order. Backed by the power of government to compel respect for standards of fair competition the decent majority should be able to eradicate the abuses which have so often brought the industry to the brink of bankruptcy.

This actual lodgment of power to punish wrongdoers, if supported effectively by the organized opinion of the industry, may seldom require its being invoked. The fact that the penalty can and will be inflicted by Federal action may be a sufficient deterrent.

In that respect the industry recovery bill is characteristic of President Roosevelt's apparent policy. He asks and obtains unusual power, but with the evident belief that the mere fact he has such power will obviate the necessity for using it. It is the modern version of the iron hand in the silken glove.

It is this conviction that has won the support of ultra-conservatives who would otherwise be aghast at much that has been done, and, if it is a correct interpretation, it is a new and high order of statesmanship.

It is in direct contrast to the ruthless policy of mere repression, exemplified in the oil dictatorship proposal. The one is constructive, the other destructive.

It is unfortunate that some of the sanity attributed to the President's policies could not have been injected into the new tax legislation. It is hard to understand the mental operations of congressmen who, after being told by the President of the serious situation of the oil industry, should immediately handicap it still further by additional taxation that is certain to reduce its business.

The evil virtue of consistency is reported to have prevented congressmen who voted against a sales tax last session changing their votes now. They prefer to be consistently wrong, rather than occasionally right.

What difference is there between a sales tax on gasoline and a sales tax on some product of a congressman's district? The clamorous mercantile opposition to a general sales tax is simply selfish and shortsighted. Being widespread it would have amounted to only 1⅛ per cent. Put that beside this added burden on the gasoline consumer already paying from 35 to 100 per cent tax on his motor fuel!

But common sense and justice have equally little consideration in tax levying. The oil industry has never failed to yield handsomely, so why bother about anything else. The millions of stockholders and consumers who suffer from this discrimination are never thought about. It is the easiest way to raise the money and that is all Congress thinks of.

Not even the President's warning about the seriousness of the oil situation suggested a doubt that there might be a limit to the productiveness of gasoline taxation. Sharp declines in consumption where taxes were heaviest were ignored. Still other taxes on oil are being put forward.

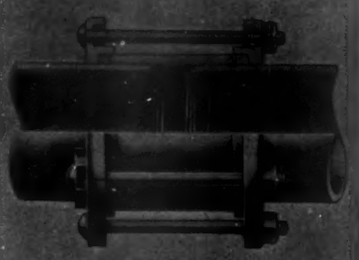
And at the same moment Congress is considering legislation to rehabilitate the industry it is doing its utmost to tax to death!

DRESSERS!

FOR EVERY TYPE OF PIPE LINE

REPAIR

STYLE 41
DRESSER COLLAR LEAK CLAMP



STYLE 4½-H.P.
DRESSER BELL JOINT CLAMP

STYLE 41 Clamps prevent or permanently repair leaks at ends of screw collars on steel pipe, size 4½-inch and up. (Smaller pipe takes Style 4 Clamps of same design.)

STYLE 4½-HP Clamps repair leaking lead or other bell-and-spigot cast-iron pipe joints, or reinforce and supplement joints of that type.

DRESSER Porous Weld Repair Clamps effectively and permanently repair porous welded joints. When the bolts are drawn up, the rubber gasket is tightly clamped over the weld.

STYLE 52 Sleeves repair (by completely enclosing) circumferential welds, screw collars, welded joints of the bell-and-spigot and double-bell types; and split pipe. Sizes 4" I.D. to 26" O.D.

S. R. Dresser Mfg. Company
Bradford, Pa.
In Canada: Dresser Mfg. Company, Ltd.
32 Front Street, W., Toronto, Ontario

DRESSER
POROUS WELD REPAIR CLAMP

STYLE 52
DRESSER CAST SPLIT SLEEVE

Bright Stocks and Wax Advance in Oklahoma Refinery Market With Kerosene Weak

By C. O. WILLSON

An advance of 1 cent per gallon in bright stock and fractionally higher prices for wax were the week's contribution on the up-side in the Oklahoma (Group 3) refinery market. An increase of one-half cent the latter part of last week in bright stock was followed on Monday with an additional half cent so that most of the manufacturers are now quoting 17 cents per gallon for their 150-160 zero to 10 grade with corresponding advances in other grades. The demand for bright stock has shown substantial improvement during May and this fact coupled with a stronger Pennsylvania market accounts for the steady price increase since the middle of April when the principal grade in Oklahoma dropped to a low of 12 cents. Additional advances are being predicted by the manufacturers.

Petroleum wax also was stronger in the Oklahoma market both for export and domestic movement. Exporters are reported to be offering 2.2 and 2.25 cents per pound for the 124-126 grade at New Orleans and the manufacturers are quoting the same grade in Oklahoma over a price range of 1⅞ to 2⅛ cents.

Gasoline Situation Mixed

The bright stock advance which was accompanied by increases on some grades of steam refined stocks by several manufacturers was practically the only development of an optimistic nature in the Oklahoma market. Refinery gasolines were holding their own in regard to price ranges although the market situation was mixed. Some of the lower price sellers the first of the week were endeavoring to advance their quotations on the third grade to a low of 2 to 2⅛ cents. At the same time there was some dumping the latter part of last week of material coming within the middle octane rating at prices which were from one-eighth to one-fourth cent under the prices which a majority of the sellers are endeavoring to maintain for this grade. The bulk of these sales were interrefinery transactions. While most of these sales are not open market transactions in the same sense as a spot sale by refiners to jobbers, they are known to the trade and have had a bearish tendency on the second grade sales over the past week.

The willingness of these refiners to sell a gasoline coming within the 60-64 octane rating under the new C.F.R. motor method at a price around 2¼ cents in part reflects a tank car market condition brought about by the recent substantial declines in tank wagon and service station schedules throughout the Middle West. These reductions have reversed the comparative price situation existing between contract and spot prices previous to the changes.

At this time the net return to Oklahoma refiners on most of their marginal contracts with jobbers located in the Middle West is under 1.5 cents per gallon with many under 1 cent per gallon. Cases are reported in which a check or credit memorandum accompanies the bill of lading from the refiner, the margin which has been guaranteed to the buyer resulting in a condition in which the former owes the latter on all gasoline shipments. With this condition existing, spot sales of gasolines at 2 or more cents per gallon are now attractive to several refiners who formerly moved practically no gasoline on the open market. At the same time many jobbers are taking the maximum quantities allowed under contracts with their refiners and this accounts for the fact that several of the latter have been forced to make open market purchases to take care of the increased volume of business.

The significance of this situation from the standpoint of the spot tank car market in Oklahoma and other Mid-Continent areas is readily apparent. With contract prices lower than the spot market buying is confined to the contracts as much as possible and the open market sales decrease in volume. This obviously if continued over any length of time will bring the open market quotations down to the contract levels. Although a majority of the larger and small refinery operators in the Mid-Continent sell all or a large part of their gasoline production through contracts with jobbers or affiliated distributing units, there are a number of operators who are entirely dependent on spot sales. The latter are now being forced to compete in sales to jobbers with prices based on contracts.

Cancel Contracts

In regard to contracts it is known that some refiners have given cancellation notices to their jobber customers due to the low net returns received. Others are attempting to secure revisions in the guaranteed margins to apply at least during the period of low tank wagon and service station prices. The cancellations when they become effective will tend to make more gasoline available on the spot market.

In most cases it appears that the con-

Refined Market Barometer

A seasonal increase in gasoline consumption did not result in any strengthening of prices at refineries throughout the United States over the past week. Prices were lower in the eastern part with minor changes in other sections. Kerosenes were generally weaker and prices lower when any changes were made and distillates were less active. No important price changes were reported in fuel oil and gas oil. Cylinder stocks were reported stronger and prices higher in several areas. Paraffin wax in better demand and prices fractionally higher.

Mid-Continent—Refinery gasolines unchanged. Natural gasolines slow and prices lower. Kerosene and distillate market less active and prices lower on some grades. Bright stocks higher. Wax prices advance.

East Coast—Refinery gasoline prices lower. Kerosene less active. No changes in other products.

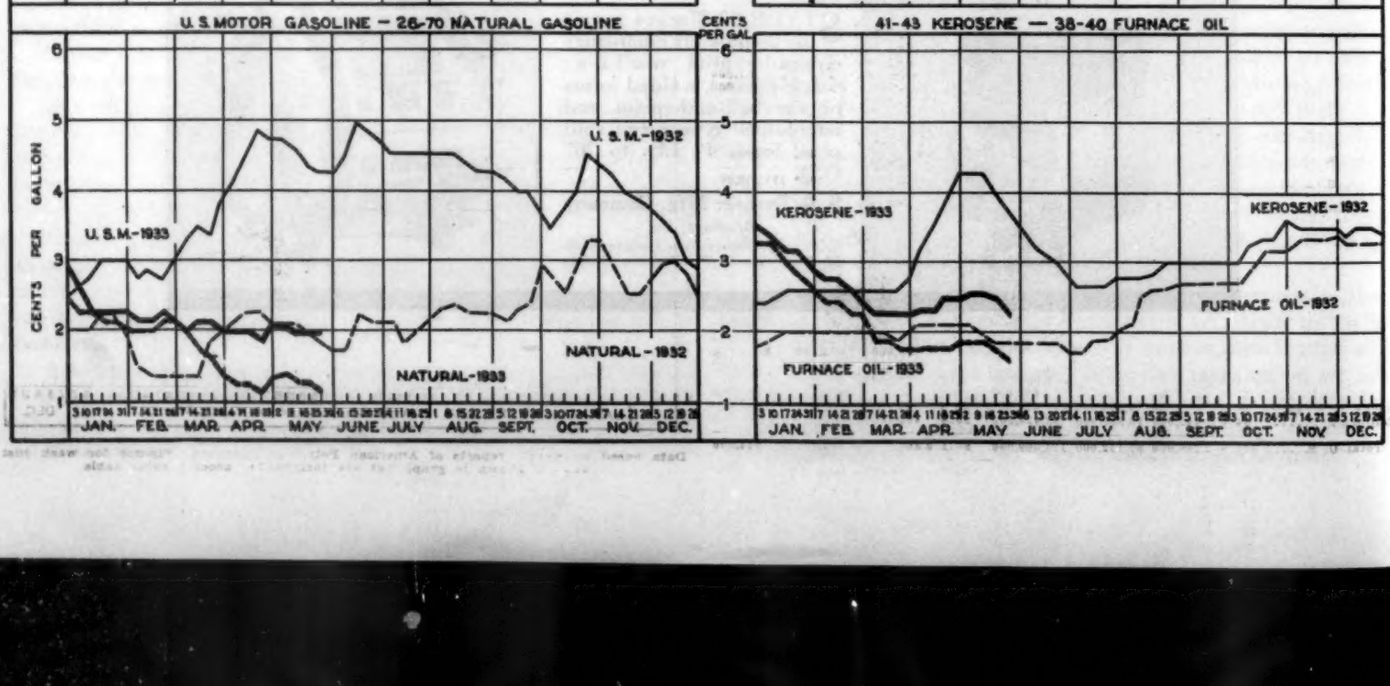
Chicago—Spot demand for gasoline slow. Some grades of special naphthas reduced. Less demand for kerosene and prices lower.

Pennsylvania—Bright stocks prices higher. Gasoline and kerosene slow.

Gulf Coast—All products holding in price except kerosene, which is weak.

California—Better demand for gasoline and some refiners have advanced domestic prices. Other products unchanged.

Representative Mid-Continent Quotations on Crude Oil and Refined Products Basis Oklahoma (Group 3)



tracts cannot be canceled during the period stated in the agreements without the consent of the buyer and in these cases the sellers must continue to make shipments regardless of the net return to them.

As more and more of these contracts have come to light over the past two weeks the trade has realized their inequities and the contributions they have made to the generally chaotic conditions in tank wagon and retail markets which in turn are responsible for the decision on the part of major distributors to reduce wholesale and retail prices. There was less uniformity in the terms of these contracts than was generally realized by the trade. Jobbers enjoying wide guaranteed margins have operated with the view of increasing volume of business rather than maintaining prices which would permit profits to their competitors. In some cases these contracts have from one to five years yet to run with no provision for cancellation. These contracts are extremely serious to the sellers unless buyers will consent to adjustments.

In this connection special attention is called to an article by Allan Jackson, vice president of the Standard Oil Co. (Indiana) appearing elsewhere in this issue in which he explains the recent action of the company in making drastic reductions in tank wagon and service station prices and also outlines the plans which will form the basis for future marketing operations. Some reductions in discounts are already being made and it is understood that important revisions in the regular Q.D.A. are shortly to be announced.

With the Indiana Standard taking this position apparently as a permanent program it is certain that Mid-Continent refiners must change their policies in the past in regard to margins allowed jobbers in tank car sales. One large operator predicts that the net results of present conditions will be contracts with margins not in excess of 4 cents to take the place of the five to six guarantees now in effect.

Gasoline and Naphtha

As previously explained sellers in Oklahoma the first of the week were endeavoring to establish a low of 2 cents for the third grade U. S. Motor gasoline in Oklahoma. In this effort they were having less competition from East Texas refiners than was the case earlier in the month. However, there was dearth of spot business on Monday and Tuesday and it was not certain that the 2-cent level could be maintained.

Except for the interrefinery buying previously mentioned a low of 2⅜ cents was being maintained for the middle bracket gasoline. The top bracket was unchanged from last week with a low of 2⅝ cents. The higher gravity gasolines were dull and unchanged in price.

Naphthas continue in strong demand and for suitable blending material sellers are obtaining at least the low of the U. S. Motor grade.

Natural Gasolines

Continued weakness in natural gasolines is one of the disturbing factors in the general motor fuel market. New buying has been practically at a standstill for several days. In Oklahoma the prevailing price for the 26-70 grade dropped to a new all time low of 1⅛ cents and 1 cent in Texas. The lower vapor pressure grades are from one-eighth to one-fourth cent under the prevailing market of a week ago.

The extreme dullness in natural gasolines probably is due to the unsettled conditions in refinery gasolines. With the latter prices at unprofitable levels, refiners are loathe to buy natural gasolines even though the latter is needed to improve the quality of their products both from standpoint of volatility and octane rating. The export market demand for all grades also has been extremely dull, resulting in the accumulation of substantial storage at Gulf Coast terminals by manufacturers and exporters.

Several manufacturers are shifting to the low vapor pressure grades and others are prepared to do so when the demand justifies. Unfortunately, prices around 2 cents for grades as low as 9 pounds are not attracting any large volume of business from jobbers. It is predicted that many plants will find it necessary to shut down temporarily unless this condition changes within the next week or ten days.

Kerosene and Distillate

The kerosene market in Oklahoma continues to point downward. The 41-43 grade dropped to a low of 2¼ cents in Oklahoma the first of the week with a spread up to 2¾ cents for this grade. Several refiners with regular outlets report a steady demand for their kerosene with no excess material on hand. At the same time large quantities of East Texas kerosene have been made available for northern markets over the past week. While some of this kerosene is not specification material, several operators in that area and other parts of inland Texas have kerosene to sell which meets the requirements of the most discriminating buyers. In Texas the 41-43 grade of 525 endpoint and under 150 flash has been offered as low as 2 cents with other material as low as 1¾ cents.

The weakness in kerosene has been passed on to the higher gravity distillates. The straw and prime white grades are available in Oklahoma over a price range of 1½ to 2 cents per gallon. These prices could be shaded in East Texas selling on Group 3 basis. The 32-36 zero flash furnace oil was holding at a low of 1⅝ cents. Some of this grade is being bought by jobbers and large furnace oil distributors for storage purposes.

Fuel Oils and Gas Oils

There is little new business in industrial fuel oil and gas oils. Prices were holding because supplies in Oklahoma for spot delivery are limited. The high cold test grades are scarce in Oklahoma due to the fact that a group of skimming plant operators in the Oklahoma City Field have not been able to secure crude oil.

The 26 to 32 gravity grades of fuel oil are available from two or three sources in Oklahoma with quotations as high as 70 cents per barrel. U.G.I. gas oil sales were reported at seven-eighths cent and 1 cent per gallon.

Large Number of Refiners Licensed to Start Sale of "Q" Brand Gasoline

With distributors authorized to start the retail sale of "Q" brand gasoline May 27 a large number of refiners and several jobbers have been granted licenses by the Ethyl Gasoline Corp. It is understood that a few companies will be in a position to start the initial distribution on Saturday, May 27, and the remainder will complete arrangements to begin retail sale early in June.

The Ethyl corporation several weeks ago announced plans for licensing a "Q" or second grade gasoline to contain tetraethyl lead. The agreement with refiners and jobbers limits the top octane rating of the "Q" brand to 70 under the new C.F.R. motor method of testing with 1½ cc. of lead the maximum allowed in the production of this grade. The gasoline can be colored any color except red which is the standard color for the premium grade of Ethyl Gasoline. The "Q" brand Ethyl Gasoline is to be sold at the regular grade price which is 2.5 to 3 cents under the premium grade of Ethyl Gasoline.

A check of the refiners who have been licensed to sell the "Q" brand shows that their refineries have a crude oil capacity of approximately 1,250,000 bbls. or one-third of the total of operating plants in the United States. There are sufficient licensees to assure a fairly general distribution throughout the United States with the exception of the West Coast. In most cases these licensees will add the tetraethyl fluid to their regular or house brand gasolines.

The largest distributors of the "Q" brand will be the Standard Oil Co. of New Jersey and its subsidiaries, the Colonial Beacon Oil Co., Standard Oil Co. of Pennsylvania, Standard Oil Co. of Louisiana and the Humble Oil & Refining Co. The Socony-Vacuum group of companies will also start the sale of the "Q" brand including Standard Oil Co. of New York, Vacuum Oil Co., Inc., Wadhams Oil Co., Lubrite Refining Corp., White Eagle Oil Corp., White Star Refining Corp. and Magnolia Petroleum Co.

The Standard Oil Co. of Ohio will ethylize its regular grade and two Ohio jobbing organizations which it controls—the Fleet-Wing Corp. and the Refiners Oil Co.—have also been granted licenses. The Standard Oil Co. (Indiana) has not decided to sell the "Q" brand although the Pan American Petroleum Co., a subsidiary, has been granted a license for eastern and southern distribution.

The other companies which have been granted licenses up to the first of this week were as follows: Ashland Refining Co., Barnsdall Refining Co., Eason Oil Co., Freedom Oil Works, Johnson Oil Refining Co., Kanotex Refining Co., Louisiana Oil Refining Corp., Mid-Continent Petroleum Corp., Marathon Oil Co., Pennsylvania Refining Co., Pennzoil Co., Phillips Petroleum Co., Pure Oil Co., Richfield Oil Co. of New York, Root Refining Co., Inc., Skelly Oil Co., Tide Water Oil Co. and Tri-State Refining Co.

American Petroleum Institute Weekly Refinery Statistics

Figures below reported for week by American Petroleum Institute. (1) Per cent refinery capacity represented. (2) Daily average crude runs to stills. (3) Total motor fuel stocks. (4) Gas oil and fuel oil stocks. All figures in 42-gallon barrels.

Week Ending May 20, 1933, Compared to Week Ago

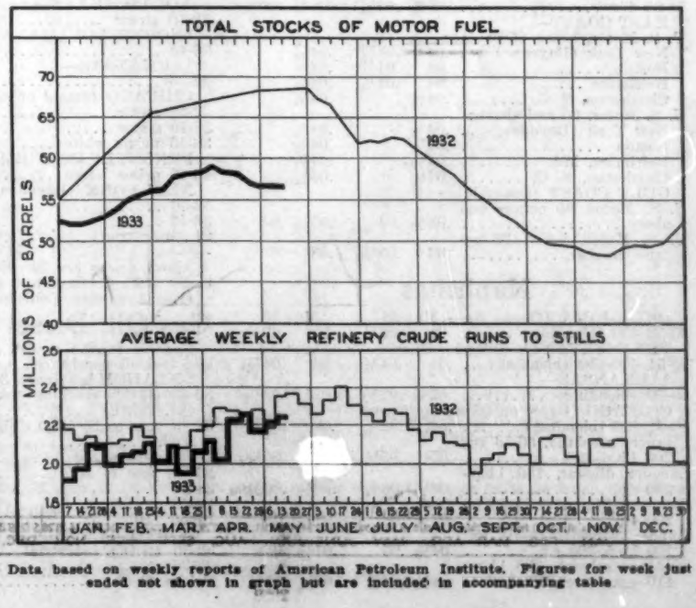
	Week ending May 20, 1933				Week ending May 13, 1933			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
East Coast	99.1	463,000	16,681,000	6,579,000	99.1	483,000	16,653,000	6,405,000
Appalachian ...	95.0	93,000	2,177,000	822,000	95.0	97,000	2,142,000	876,000
Ind., Ill., Ky. ..	97.5	304,000	8,673,000	3,779,000	97.5	310,000	8,543,000	3,689,000
Okla., Kans., Mo.	84.9	216,000	4,885,000	3,076,000	84.9	214,000	4,968,000	3,057,000
Inland Texas ...	56.4	101,000	1,737,000	2,164,000	56.4	92,000	1,591,000	2,134,000
Tex. Gulf	97.7	455,000	5,921,000	5,957,000	97.7	448,000	5,696,000	6,035,000
La. Gulf	97.3	108,000	1,522,000	1,969,000	97.3	103,000	1,524,000	1,920,000
N. La. and Ark..	88.5	44,000	316,000	679,000	88.5	39,000	319,000	691,000
Rocky Mtn.	90.8	40,000	1,264,000	656,000	90.8	36,000	1,319,000	641,000
California	94.6	442,000	13,986,000	98,428,000	94.6	421,000	13,964,000	97,960,000
Total U. S. ...	91.6	2,266,000	57,162,000	124,009,000	91.6	2,243,000	56,719,000	123,308,000

Total motor fuel stocks Bureau of Mines basis 58,760,000 bbls.

Week Ending May 20, 1933, Compared to Year Ago

	Week ending May 20, 1933				Week Ending May 21, 1932			
	(1)	(2)	(3)	(4)	(1)	(2)	*(3)	(4)
East Coast	99.1	463,000	16,681,000	6,579,000	100.0	453,100	6,337,000	6,211,000
Appalachian ...	95.0	93,000	2,177,000	822,000	91.8	103,000	1,760,000	1,005,000
Ind., Ill., Ky. ..	97.5	304,000	8,673,000	3,779,000	98.9	306,700	6,545,000	4,122,000
Okla., Kans., Mo.	84.9	216,000	4,885,000	3,076,000	89.6	246,000	3,995,000	3,335,000
Inland Texas ...	56.4	101,000	1,737,000	2,164,000	....	100,000	1,612,000	2,321,000
Tex. Gulf	97.7	455,000	5,921,000	5,957,000	99.8	480,900	6,451,000	6,138,000
La. Gulf	97.3	108,000	1,522,000	1,969,000	100.0	114,600	1,703,000	3,394,000
N. La. and Ark..	88.5	44,000	316,000	679,000	....	49,500	150,000	832,000
Rocky Mtn.	90.8	40,000	1,264,000	656,000	89.4	42,900	2,046,000	643,000
California	94.6	442,000	13,986,000	98,428,000	96.6	462,700	14,053,000	96,545,000
Total U. S. ...	91.6	2,266,000	57,162,000	124,009,000	95.1	2,364,400	44,702,000	125,546,000

*Refinery stocks only.



Data based on weekly reports of American Petroleum Institute. Figures for week just ended not shown in graph but are included in accompanying table

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement except as otherwise noted

EXCLUSIVE OF TAXES

The following quotations are exclusive of the Federal excise taxes of 1 cent a gallon on gasoline and 4 cents on lubricating oils, which became effective June 21, 1932.

Refinery Gasolines

	May 23		May 16	
OKLAHOMA (Group 3)—				
*U. S. Motor grades:				
Regular	.02⅜	.02⅝	.02⅜	.02⅝
Premium	.02⅝	.02¾	.02⅝	.02¾
Third grade	.02	.02¼	.02	.02¼
60-62 400 grades:				
Regular	.02½	.02⅝	.02½	.02⅝
Premium	.02¾		.02¾	
Third grade	.02½	.02¼	.02½	.02¼
64-66 390	.02¼		.02½	
64-66 375	.02½	.02⅝	.02½	.02⅝
68-70 350	.02⅝		.02⅝	
NORTH TEXAS—				
U. S. Motor grades:				
Regular	.02⅜	.02½	.02⅜	.02½
Premium	.02⅝	.02¾	.02⅝	.02¾
Third grade	.02	.02½	.02	.02½
60-62 400	.02½	.02¾	.02½	.02¾
64-66 390	.02¼		.02½	
64-66 375	.02⅝	.02½	.02⅝	.02½
64-66 360	.02½	.02¾	.02½	.02¾
†NORTH LOUISIANA—				
U. S. Motor grades:				
Regular	.02¾	.02⅞	.02¾	.02⅞
Premium	.03	.03⅛	.03	.03⅛
Third grade	.02¾	.02½	.02¾	.02½
60-62 400	.02½	.02⅝	.02½	.02⅝
†ARKANSAS—				
U. S. Motor grades:				
Regular	.02¾	.02⅞	.02¾	.02⅞
Premium	.03		.03	
Third grade	.02⅝	.02½	.02⅝	.02½
CHICAGO (Based on Oklahoma Group 3)—				
U. S. Motor grades:				
Regular	.02¼	.02½	.02⅜	.02⅝
Premium	.02½	.02¾	.02⅝	.02⅞
Third grade	.02	.02¼	.02	.02¼
60-62 400	.02⅛	.02¼	.02⅛	.02⅜
64-66 375	.02⅝	.02½	.02⅝	.02½
68-70 360	.02½	.02¾	.02½	.02¾
Aviation fighting grade	.03	.03¼	.03	.03¼

***Octane Ratings**—The following octane ratings apply to the three grades of U. S. Motor gasoline: Regular, 60-64 octane number; premium, 65 and above octane number; third grade, 59 and below octane number. Octane ratings determined by C.F.R. Motor Method.

†For Arkansas, Louisiana and Mississippi delivery.

PENNSYLVANIA (inland refineries)—				
U. S. Motor	.04¼	.04½	.04½	.04⅝
60-62 400	.04½	.04¾	.04¾	.04⅞
64-66 375	.04⅝	.04¾	.05	
68-70 350	.04¾	.05	.05	.05¼
CALIFORNIA (domestic movement)—				
54-58 U. S. Motor	.05¼	.06½	.05¼	.06½
58-60 400	.05¾	.06¾	.05¾	.06¾
EAST COAST—				
U. S. Motor, below 65 octane:				
New York (Bayonne)	.04	.04¼	.04¼	
Boston	.04	.04¼	.04¼	
Baltimore	.04	.04¼	.04¼	
Charleston, S. C.	.04¼		.04¼	
U. S. Motor, 65 and above:				
New York (Bayonne)	.04½		.04½	
Boston	.04½		.04½	
Baltimore, Md.	.04½		.04½	
Charleston, S. C.	.04½		.04½	
GULF COAST (domestic)—				
U. S. Motor, 65 octane and above	.03½	.04	.03½	.04
U. S. Motor, below 65 octane number	.03	.03½	.03	.03½

Naphthas

	May 23		May 16	
OKLAHOMA (Group 3)—				
50-52 450 (blending)	.02	.02⅛	.02	.02⅛
PENNSYLVANIA (inland refineries)—				
50-54 430-450 (blending)	.04	.04¼	.04	.04¼
†ARKANSAS—				
48-50 (blending)	.02¼	.02½	.02¼	.02½
CHICAGO (Based on Oklahoma Group 3)—				
50-62 450 (blending)	.02	.02⅛	.02	.02¼
Cleaners' naphtha, 56-58 gr., 200 i.b.p.-320 e.p.	.05	.05¼	.05	.05¼
Lacquer diluent, 180 i.b.p.-250 e.p.	.06½	.06¾	.06½	.06¾
Lacquer diluent, 140 i.b.p.-200 e.p.	.07½	.08	.07½	.08
Rubber solvent, 68-70 gr., 100 i.b.p.-300 e.p.	.04½	.05	.04½	.05
Stoddard solvent, 300 i.b.p.-410 e.p., over 83° flash	.04½	.04¾	.04½	.04¾
Pet. thinner, 290 300 i.b.p.-415 e.p., over 83° flash	.04¼	.04½	.04¼	.04½
V.M.&P. naphtha, 56-58 gr., 190-200 i.b.p.-330 e.p.	.05		.05	
Petroleum spirits	.03⅞	.04	.03⅞	.04

Natural Gasolines

	May 23		May 16	
OKLAHOMA (Group 3)—				
Grade 18-55	.01¼	.01⅜	.01⅜	.01½
Grade 26-70	.01⅛		.01¼	
Grade 30-70	.01		.01⅛	.01¼
*Low pressure grades:				
15 lb. v.p. (max.)	.01½	.01⅝	.01⅝	.01¾
11 lb. v.p. (max.)	.02		.02⅛	
NORTH TEXAS—				
Grade 18-55	.01¼		.01⅜	
Grade 26-70	.01		.01⅛	.01¼
Grade 30-70	.01		.01⅛	
*Low pressure grades:				
15 lb. v.p. (max.)	.01⅜	.01½	.01⅝	.01¾
11 lb. v.p. (max.)	.01⅛	.02	.02⅛	.02¼
NORTH LOUISIANA—				
Grade 26-70	.01¼		.01⅜	
CALIFORNIA—				
75-78 375	.03¾	.04¼	.03½	.04

Kerosenes

(All kerosenes water white)

	May 23		May 16	
OKLAHOMA (Group 3)—				
41-43	.02¼	.02⅝	.02½	.02¾
42-44	.02⅝	.02⅞	.02⅝	.02⅞
NORTH TEXAS—				
40-41	.02½		.02¼	.02⅜
41-43	.02⅛	.02¼	.02⅝	.02½
†NORTH LOUISIANA—				
41-43	.02⅝	.02¾	.02¾	.03¼
42-44	.02¾	.03	.03	.03¼
†ARKANSAS—				
41-43	.02¾		.03	.03¼
PENNSYLVANIA (inland refineries)—				
45	.04	.04⅛	.04⅛	
46	.04¼		.04¼	
47	.04½		.04½	.04¾
CHICAGO (Based on Oklahoma Group 3)—				
41-43	.02½	.02⅝	.02½	.02¾
42-44	.02⅝	.02¾	.02⅝	.02⅞
***CALIFORNIA—**				
38-40 high burning test	.03½	.04¼	.03½	.04¼
NEW YORK (Bayonne, N. J.)—				
41-43	.04¾	.05¼	.05¼	
GULF COAST (domestic)—				
41-43 water white	.03¾	.04	.03¾	.04

*For Pacific Coast consumption.

†For Arkansas, Louisiana and Mississippi delivery.

Furnace Oils and Tractor Fuels

	May 23		May 16	
OKLAHOMA (Group 3)—				
32-36 straw	.01⅝	.01¾	.01⅝	.01⅞
36-38 straw	.01¾	.01⅞	.01¾	.01⅞
38-40 straw	.01⅝	.01¾	.01¾	.01⅞
39-41 prime	.01¾	.02	.01⅞	.02
NORTH TEXAS—				
38-40 straw	.01⅝	.01¾	.01¾	.01⅞
†NORTH LOUISIANA—				
36-40	.02¼	.02½	.02½	.02¾
†ARKANSAS—				
32-36	.02¼	.02½	.02½	.02⅝
CHICAGO (Based on Oklahoma Group 3)—				
32-36 straw	.01⅝	.01⅞	.01⅝	.01⅞
38-40 straw	.01¾	.01⅞	.01¾	.01⅞
38-40 prime white	.01¾	.02	.01¾	.02
PENNSYLVANIA (inland refineries)—				
40-41 prime white	.03	.03¼	.03	.03¼
NEW YORK (Bayonne, N. J.)—				
32-36	.04		.04	
36-40	.05		.05	
21 (industrial)	.03½		.03½	

Above prices are for distillate oils of zero cold test under 190° F. flash and good odor.

†For Arkansas, Louisiana and Mississippi delivery.

Gas Oil, Diesel Oil and Fuel Oil

Gas oil (G.O.) quoted per gallon basis; Diesel oil and fuel oil per barrel.

	May 23		May 16	
OKLAHOMA (Group 3)—				
32-36 (G.O.) cracking stock	.00⅞	.01	.00⅞	.01
U.G.I. (G.O.)	.00⅞	.01	.00⅞	.01
32-36, zero to 15 (G.O.) high flash	.01¼	.01⅜	.01¼	.01⅜
28-30, zero to 10	.60	.65	.60	.65
26-30, zero to 10	.50	.60	.50	.60
24-26	.35	.40	.35	.40
20-22	.30	.32½	.30	.32½
Below 16	.27½	.30	.27½	.30
NORTH TEXAS—				
32-36 (G.O.) industrial	.00⅞	.01	.00⅞	.01
22-26	.35	.40	.35	.40
Below 20	.30	.32½	.30	.32½
†NORTH LOUISIANA—				
32-36 (G.O.) zero	.02	.02¼	.02¼	
14-16	.35		.35	
†ARKANSAS—				
30-32 (G.O.) zero	.02¼		.02¼	
14-16	.35		.35	
CHICAGO (Based on Oklahoma Group 3)—				
32-36 (G.O.) industrial	.00⅞	.01	.00⅞	.01
28-30 (zero)	.65	.70	.65	.70
26-28 (zero)	.55	.60	.55	.60
22-26 (zero)	.45	.50	.45	.50
18-22 (zero)	.37½	.42½	.37½	.42½
Below 18	.27½	.37½	.27½	.37½
PENNSYLVANIA (inland refineries)—				
36-40	.03¼	.03⅜	.03¼	.03⅜

Note: Fuel oils of more than 40 cold test generally 5 to 15 cents per barrel less in all areas than shown in above tables.

†For Arkansas, Louisiana and Mississippi delivery.

CALIFORNIA—				
30-34 (G.O.) per bbl.	.80	.90	.80	.90
27 plus Diesel	.80	.90	.80	.90
15-19 bunker (at tidewater)	.50	.60	.50	.60
15-19 (cargo lots)	.45	.55	.45	.55
15-19 (tank cars)	.35	.50	.35	.50
GULF COAST—				
28-30 (G.O.)	.02⅝	.02⅞	.02⅝	.02⅞
28-30 Diesel	1.50		1.50	
Bunker C (bulk cargoes)	.50	.55	.50	.55
Bunker C (bunkers)	.60	.65	.60	.65
NEW YORK (Bayonne, N. J.)—				
28 plus (G.O.)	.04		.04	
*28-30 Diesel	1.65		1.65	
26-30 Diesel (tank cars)	.04		.04	
‡Bunker C	.70	.75	.70	.75

*Lighterage 6½ cents per barrel.

†Lighterage 5 cents per barrel.

‡Contract price at New York Harbor to ocean-going steamships only.

Petroleum Coke*

Prices per ton f.o.b. refineries in Chicago area.

Breeze (screenings)	4.50	4.50
Still runs	5.50	5.50
Lump and egg	6.50	6.50

*Refineries will absorb freight to 80 cents a ton.

Neutral Oils

(Viscosity at 100° F. and color)

	May 23		May 16	
OKLAHOMA (Group 3)—				
Zero to 10 Cold Test:				
150-3	.06½	.06½	.06¼	.06½
180-3	.07½	.07¾	.07½	.07¾
180-4	.07¼	.07½	.07¼	.07½
200-3	.08	.08¼	.08	.08¼
200-4	.07¾	.08	.07¾	.08
240-3	.10	.10¼	.10	.10¼
240-4	.09¾	.10	.09¾	.10
280-3	.11	.11¼	.11	.11¼
280-4	.10½	.10¾	.10½	.10¾
300-3½	.11¼	.11½	.11¼	.11½
350-3½	.11¾	.12	.11¾	.12
400-4	.12¼	.12½	.12¼	.12½
500-4½	.12¾	.13	.12¾	.13
100-2 paraffin oil	.04¼	.04½	.04¼	.04½
15-30 Cold Test:				
200-3	.07¼	.07½	.07¼	.07½
200-4	.07	.07¼	.07	.07¼
240-3	.09¼	.09½	.09¼	.09½
240-4	.09	.09¼	.09	.09¼
280-3	.10¼	.10½	.10¼	.10½
280-4	.10	.10¼	.10	.10¼
PENNSYLVANIA—				
150 vis., No. 3, 400-405:				
Zero pour test	.17		.15¾	.16
10 pour test	.16½		.15½	.15¾
15 pour test	.15		.13¾	.14
25 pour test	.14¼		.13¼	.13½
180 vis., No. 3, 25 pour test	.15¾		.14¾	
200 vis., No. 3:				
Zero pour test	.19½		.18	.18½
10 pour test	.18¾		.17¼	.17½
15 pour test	.17½		.16	.16½
25 pour test	.17		.15¾	.16
GULF COAST—				
Pale Oils:				
100-2-2½	.04¾	.05¼	.04¾	.05¼
200-3	.05½	.06	.05½	.06
300-3	.06¾	.07¼	.06¾	.07¼
500-3½	.08¾	.09¼	.08¾	.09¼
750-3½	.09¾	.10¼	.09¾	.10¼
1,200-3½	.12	.12¼	.12	.12¼
2,000-4	.13	.13¾	.13	.13¾
Red Oils:				
200-5-6	.05	.05½	.05	.05½
300-5-6	.06	.06½	.06	.06½
500-5-6	.07	.07½	.07	.07½

1,200-5-6	.10¼	.10¾	.10¼	.10¾
2,000-6 plus	.12	.12½	.12	.12½
CALIFORNIA—				
Pale Oils:				
100-2½-3	.09	.09½	.09	.09½
200-2½-3	.09½	.10	.09½	.10
300-3-3½	.10½	.11	.10½	.11
350-3-4	.11	.11½	.11	.11½
400-3-4	.11½	.11¾	.11½	.11¾
450-3-4	.11¾	.12	.11¾	.12
550-3-4	.12	.12½	.12	.12½
Red Oils:				
200-4-5	.09½	.10	.09½	.10
300-5-6	.10½	.11	.10½	.11
350-5-6	.11	.11½	.11	.11½
400-5-6	.11½	.11¾	.11½	.11¾
450-4-6	.11¾	.12	.11¾	.12
500-5-6	.12	.12½	.12	.12½
600-5-6½	.12¼	.12½	.12¼	.12½
700-6½ plus	.12½	.12¾	.12½	.12¾
750-6½ plus	.12¾	.13	.12¾	.13
900-6½ plus	.13	.14½	.13	.14½

Bright and Steam Refined Stocks

	May 23		May 16	
OKLAHOMA (Group 3)—				
630 light green	.05½	.06½	.05½	.06½
600 light green S.R.	.05	.06	.05	.06
600 dark green S.R.	.03½	.04	.03½	.04
Bright Stocks:				
190-200 D	.19¼	.19¾	.17¾	.18¾
150-160 D, 0-10	.17		.16	
150-160 D, 10-25	.16½		.15½	
150-160 D, 25-40	.16		.15	.15¼
150-160 E	.15		.14	
PENNSYLVANIA—				
600 S.R.	.11		.00	
650 S.R.	.13¼		.11¼	.12
600 Pennsylvania flash	.14		.13	
630 D filtered	.19		.17½	
600 E filtered	.14½		.13½	.14½

Pennsylvania Grade bright stock:				
No. 8 color, 145-50 vis. at 210; 540-550 flash:				
10 pour test	.23		.22	.23
15 pour test	.21		.20	.21
25 pour test	.20		.19	.20

Wax and Petrolatum

(Prices per pound)

	May 23		May 16	
OKLAHOMA (Group 3)—				
124-126 white crude scale	.01⅞	.01⅞	.01¾	
PENNSYLVANIA—				
122-124	.02¼	.02¼	.0205	
124-126	.02⅛	.02¼	.02⅛	.02¼
NEW YORK HARBOR (domestic)—				
120-122 (a.m.p. basis)	.02⅞		.03	
125-127	.03		.03⅛	
130-132	.03½		.03½	
133-135	.04¼		.04¼	
135-137	.04½		.04½	
Petrolatum in barrels in carload lots:				
Dark green	.01⅞		.01⅞	
Amber	.02		.02	
Extra amber	.02⅝		.02⅝	
Lily white	.05½		.05½	
Snow white	.06½		.06½	
Cream	.04½		.04½	
CHICAGO (f.o.b. switching district)*—				
122-124	.0340	.0350	.0330	.0340
125-127	.0365	.0375	.0355	.0365
127-129	.0380	.0390	.0370	.0380
130-132	.0440	.0450	.0430	.0440
132-134	.0465	.0475	.0455	.0465

*Cents per pound on carlot orders in cotton lined burlap bags of 225 lbs. approx.
Add 3° F. for a.m.p.

Export Prices

GASOLINE

	May 23	May 16
GULF COAST—		
U. S. Motor	.03¼	.03¼

60-62 400	.03¼		.03⅜	
61-63 390	.03¼		.03⅜	
64-66 375	.03¼	.03⅜	.03⅜	.03½
LOS ANGELES, CALIF.—				
U. S. Motor, 53-55 437 e.p.	.03¾	.04¼	.03¾	.04¼
U. S. Motor, 65 octane	.04½	.04¾	.04½	.04¾
U. S. Motor, 67 octane	.05		.05	
U. S. Motor, 69 octane	.05¼		.05¼	
58-60 400 endpoint gasoline	.04¼	.05	.04¼	.05
KEROSENE				
GULF COAST—				
41-43 prime white	.03⅞		.03⅞	
41 water white	.04		.04	
LOS ANGELES, CALIF.—				
41-43 water white	.03¾	.04¼	.03¾	.04¼
LUBRICANTS				
NEW YORK (f.a.s. in bbls.)—				
600 Warren E	.20		.20	
600 S.R. unfiltered	.16		.15½	
650 S.R. unfiltered	.18		.18	
600 flash S.R.	.19½		.20	
630 flash S.R.	.26		.25½	
Bright stock, No. 8 color	.25½	.26½	.25½	.26½
Bright stock, No. 6½ color, dil.	.24½	.25½	.24½	.25½
NEUTRALS				
NEW YORK—Pale Engine Oil, Bulk (vis. at 100)—				
230-3¾	.09¾		.09¾	
180-3½	.09½		.09½	
100-2¼	.05		.05	
Red Engine Oil, Bulk (vis. at 100):				
300-6½	.09½		.09½	
250-6	.08½		.08½	
200-6	.07¾		.07¾	
PARAFFIN WAX (Fully Refined)				
NEW YORK (prices per lb.)—				
123-125 a.m.p.	.02875		.02875	
125-127 a.m.p.	.03		.03	
130-132 a.m.p.	.0350		.0350	
133-135 a.m.p.	.0425		.0425	
135-137 a.m.p.	.04375		.04375	

Crude Oil Prices

Eastern States

SOUTH PENN OIL CO.
(Effective May 22, 1933)

Pennsylvania Grade Oil in National Transit Lines (Bradford Field) $1.37
Pennsylvania Grade Oil in Southwest Pennsylvania Lines 1.07
Penna Grade Oil in Eureka Pipe Line Lines 1.02
Penna Grade Oil in Buckeye Pipe Line Lines ..... .90
Corning Grade Oil in Buckeye Pipe Line Co.'s lines (May 8, 1933) ..... .50
Ragland Grade Oil in Cumberland Pipe Lines (Kentucky) (Jan. 10, 1931).... .60

PENNZOIL CO.
(Effective May 22, 1933)

Pennsylvania Grade Oil in National Transit Lines:
Group A $1.32
Includes Cochran, Franklin, Hamilton and Doolittle districts.
Group B 1.31
Includes Titusville district.
Group C 1.30
Includes Turkey and Tidioute districts.
Group D 1.29
Includes Bear Creek and Porkey districts.
Group E 1.27
Includes Eldenau, Bull Creek, Rough Run, Carbon, Dipner, Bredin, McJunkin, Jameson, Kennerdell, Emlenton, Tiona, Lacy and Kinzua districts.
Price depends on length of pipe line haul to plant at Oil City.

TIDE WATER PIPE CO.
(Effective May 22, 1933)

Bradford, Pa. $1.37
Allegany, N. Y. 1.37

PURE OIL CO.
(Effective May 22, 1933)

Cabin Creek, W. Va. $1.02
Bradford Hollow, W. Va. 1.02
Kelly's Creek, W. Va. 1.02

Rocky Mountain States

Ilea, light (all grades) May 8, 1933.. $ .25
Fort Collins, Wellington and Greasewood, Colo., are on contract basis.
Florence (May 6, 1933) ..... .25
Dutton Creek, Wyo. (May 8, 1933) ..... .25
Rock Creek, Wyo. (Jan. 25, 1933) .....
Frannie, light (May 8, 1933) ..... .25
Frannie, heavy (May 8, 1933) ..... .20
Salt Creek (May 8, 1933) ..... .25
See Stanolind Mid-Continent price schedule
LaBarge (May 8, 1933) ..... .25
Big Muddy (May 6, 1933)* ..... .25
Big Muddy (May 8, 1933)† ..... .25
Grass Creek (Jan. 18, 1933) ..... .62
Grass Creek, heavy (Dec. 15, 1932)... .45
Elk Basin, light (Jan. 18, 1933) ..... .62
Lance Creek (Dec. 16, 1932) ..... .92
Poison Spider (Mar. 5, 1931) ..... .70
Hudson (June 2, 1931) ..... .65
Lander (Mar. 5, 1931) ..... .40
Rex Lake (Feb. 23, 1930) 1.10
Osage (Jan. 18, 1933) ..... .52
Lost Soldier (Apr. 13, 1932) ..... .80
Hamilton Dome (Dec. 16, 1932) ..... .25
Torchlight (May 8, 1933) ..... .35
Greybull (May 8, 1933) ..... .35
Cat Creek (May 6, 1933) ..... .35
Pondera (Nov. 7, 1932) ..... .60
Sunburst, Mont. (May 9, 1933) ..... .65
Hogback, N. Mex. (May 8, 1933) ..... .50
Lea County, N. Mex. (See Note) ..... .20
Maljamar (Jan. 20, 1933) ..... .25
Artesia-Jackson (Jan. 20, 1933) ..... .30

Note—Salt Creek, Cat Creek, Dry Creek, Dallas-Derby, Hudson, Greybull, Hogback, and Ilea by Stanolind Oil & Gas Co. and remainder by Ohio Oil Co. Both companies posted Grass Creek light and Elk Basin. Lost Soldier posted by Producers & Refiners Corp. Artesia, Jackson and Maljamar posted by Continental Oil Co. Lea County, effective May 2, posted by Humble Oil & Refining Co., followed by other buyers; Fort Collins, Wellington, Orchard, Florence, Big Muddy, Cat Creek, Rattlesnake and Table Mesa by Continental Oil Co. Osage posted by Arro.
*Continental Oil Co. †Ohio Oil Co.

Middle Western States

OHIO OIL CO.
(Effective May 9, 1933)

Lima $0.55
Wooster (May 8, 1933) ..... .50
Illinois ..... .47
Indiana ..... .25
Princeton ..... .47
Plymouth ..... Shut in
Western Kentucky ..... .42
Midland, Mich. (May 8, 1933)* ..... .75
Somerset, Ky. (May 9, 1933) ..... .50
Muskegon, Mich. (Mar. 27) ..... See note

*Posted by Pure Oil Co. Producers Pipe Line Co. pays 5 cents per barrel over Pure Oil Co.'s posted price. Muskegon: All companies pay $1 per barrel effective March 27. Somerset, Ky., crude purchased by Ashland Refining Co., Ashland, Ky., and posted price includes premium.

Mexico

Panuco* $0.41

*F.o.b. ship, based on April tranactions and exclusive of production and export taxes and bar dues.

Canada

Ontario (Jan. 18, 1933):
Petrolia* $1.76
Oil Springs* 1.88
Turner Valley†:
Crude oil, 31°-35.9° (Jan. 24, 1933).... 1.41
Crude oil, 36°-40.9° (Jan. 24, 1933.... 1.96
Crude oil, 50° up (Jan. 24, 1933)..... 2.41
Discolored naphtha (Jan. 24, 1933)... 2.58
Crude naphtha (Jan. 24, 1933)..... 2.83

*Imperial Oil, Ltd. †Imperial Oil, Ltd., and Regal Oil & Refining Co.

Crude Oil Prices in Kansas, Oklahoma, Texas, Louisiana and Arkansas

	Stanolind Crude Oil Pur. Co.	Stanolind Crude Oil Pur. Co.	Carter Oil Co.	Humble Oil & Refining Co.	Gypsy Oil Co.	Gulf Pipe Line Co.	Gulf Refining Co. of Louisiana	The Texas Company	The Texas Company	Magnolia Petroleum Co.	Sinclair Prairie Oil Mar. Co.	Sinclair Prairie Oil Mar. Co.	Shell Petroleum Corp.	Standard Oil Co. of Louisiana	Empire Pipe Line Co.
	May 6	May 3	May 8	May 2	May 8	May 5	May 6	May 9	May 3	May 8	May 3	May 8	May 2	May 6	May 8
Kansas	$.25	....	$.25	....	$.25	....	....	$.25	....	....	....	$.25	*$.25	....	$.25
Oklahoma	.25	....	.25	....	.25	....	....	.25	....	....	....	.25	*.25	....	.25
North-Central Tex.	....	$.25	....	$.25	....	$.25	....	....	$.25	$.25	$.25	....	....	....	....
East Central Tex.	....	.25	....	.25	....	.25	....	....	.25	.25	.25	....	....	....	....
East Texas	....	....	....	‡ .25	....	.25	....	....	.25	.25	.25	....	*.25	....	.25
West Texas	....	....	....	.20	....	.20	....	....	.20	....	....	....	.20	....	....
Gulf Coast-Tex.-La.	....	....	....	.30	....	.30	....	....	.30	.30	....	....	*.30	....	....
Salt Flat, Tex.	....	....	....	.23	....	....	....	....	....	....	....	....	.23	....	....
Pettus, Tex.	....	....	....	.35	....	....	....	....	....	....	....	....	....	....	....
Mirando, Tex.	....	....	....	.25	....	....	....	....	....	.25	....	....	....	....	....
Saxet, Tex.	....	....	....	....	....	....	....	....	.30	....	....	....	....	....	....
Duval, Tex.	....	....	....	....	....	....	....	....	.25	....	....	....	....	....	....
Darst Creek, Tex.	....	....	....	.23	....	.23	....	....	.23	.23	....	....	....	....	....
Luling, Tex.	....	....	....	....	....	....	....	....	....	.20	....	....	....	....	....
Corsicana (heavy)	....	....	....	....	....	....	....	....	....	.20	....	....	....	....	....
Lytton Springs, Tex.	....	....	....	....	....	....	....	....	....	.25	....	....	....	....	....
Bruner, Tex.	....	....	....	....	....	.23	....	....	....	....	....	....	....	....	....
Conroe, Tex.	....	....	....	.30	....	....	....	....	.30	....	....	....	....	....	....
Refugio, Tex.	....	....	....	.30	....	....	....	....	....	....	....	....	....	....	....
Gray County, Tex.	....	....	....	.20	....	....	....	....	.20	.20	....	....	....	....	....
Carson-Hutchinson	....	....	....	.18	....	.18	....	....	.18	.18	....	....	....	....	....
North Louisiana	....	....	....	....	....	....	$.25	....	.25	.25	....	....	....	$.25	....
El Dorado (light)	....	....	....	....	....	....	.25	....	.25	.25	....	....	....	.25	....
Smackover, Ark.	....	....	....	....	.20	.30	....	....	.20	....	....	....	....	.20	....
Jennings, La.	....	....	....	....	.20	....	....	....	....	....	....	....	....	....	....

*May 6, 1933. May 10. ‡May 12. †The Magnolia Petroleum Co., effective May 9, posted the following prices in Oklahoma: Below 28 degrees, 20 cents; 28 to 34.9 degrees, 23 cents; 35 degrees and above, 25 cents.

In the fields in which they are buying in Kansas or Oklahoma or both, the following other companies posted 25 cents per barrel on the date named: Bell Oil & Gas Co., May 3; Barnsdall Refineries, Inc., May 6; Pure Oil Co., May 8; Mid-Continent Petroleum Corp., May 6; Skelly Oil Co., May 6; Vickers Petroleum Corp., May 7; Anderson & Prichard, May 6; Johnson Oil & Refining Co., May 6; Champlin Refining Co., May 6; Yale Refining Co., May 6; El Dorado Refining Co., May 6; Globe Refining Co., May 6; Rock Island Refining Co., May 8; White Eagle Oil Corp., May 9; Continental Oil Co., May 8.

The Phil-Tex Oil Co. posted 20 cents in Gray County and 18 cents in Carson and Hutchinson Counties, Texas, on May 6, and on May 7 posted 25 cents in Oklahoma.

The Louisiana-Arkansas Pipe Line Co. posted 15 cents in Urania and 25 cents in other North Louisiana fields in which it buys oil. Its Smackover price of 25 cents was unchanged.

The Tide Water Oil Co. on May 6 posted 25 cents in East Texas and 40 cents in Conroe, Texas.

The Atlantic Oil Producing Co. posted 25 cents in East Texas, 20 cents in West Texas, and 35 cents in Pettus, Texas, on May 5.

H. L. Hunt, Inc., effective May 9, posted 30 cents in Urania, La. Panola Pipe Line Co. posted 25 cents in East Texas May 6.

(California Crude Oil Prices on Page 31)

TANK WAGON MARKETS

Quotations for gasoline and kerosene in United States, as furnished by the larger marketing concerns, include taxes

May 23, 1933

Taxes

The gasoline quotations given in the following tables include the 1-cent Federal tax as well as state, county and city taxes. The gasoline quoted is the regular or standard grade. In most marketing areas a third or competitive grade is generally available at 1.5 or more cents per gallon under the service station price for the regular grade. Ethyl Gasolines are sold 2 cents above the service station price for the regular grade, except in Standard of Indiana and Standard of Ohio territories where premium for Ethyl Gasoline is 2.5 cents.

Southern District

STANDARD OIL CO (KENTUCKY)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Atlanta, Ga.	18.0	18.0	7.0	10.0
Augusta	20.0	20.0	7.0	11.0
Macon	19.0	19.0	7.0	14.0
Savannah	20.0	20.0	7.0	14.0
Birm'ham, Ala.	21.0	21.0	8.0	13.0
Mobile	19.0	19.0	8.0	8.0
Montgomery	22.0	22.0	8.0	14.0
Jackson, Miss.	16.0	16.0	7.0	12.0
Vicksburg	17.5	17.5	7.0	13.0
Jack'ville, Fla.	19.0	19.0	8.0	9.5
Miami	19.0	19.0	8.0	13.5
Pensacola	20.0	20.0	8.0	14.0
Tampa	17.0	17.0	8.0	12.0
Lexington, Ky.	18.5	18.5	6.0	10.0
Covington	17.0	17.0	6.0	11.5
Louisville	17.0	17.0	6.0	10.0
Paducah	19.0	19.0	6.0	9.0

In addition to the state tax of 4 cents on gasoline, Montgomery has city and county tax of 3 cents on gasoline and one-half cent on kerosene. Kerosene prices in Georgia include 1-cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene and one-fortieth cent on gasoline. To Pensacola, Montgomery and Birmingham state taxes add 1-cent tax. To Mobile state tax add 1-cent city tax. Dealers receive discount of 3 cents off tank wagon price throughout territory.

Southwestern District

MAGNOLIA PETROLEUM CO.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Dallas, Tex.	12.5	15.0	5.0	7.5
Fort Worth	12.5	15.0	5.0	7.5
Houston	12.5	15.0	5.0	8.0
San Antonio	12.5	15.0	5.0	8.0
El Paso	13.5	15.0	5.0	8.0
Texarkana	*14.0	14.0	5.0	†11.0
Muskogee, Ok.	12.5	15.0	5.0	6.2
Okla. City	11.5	14.0	5.0	8.0
Tulsa	12.5	15.0	5.0	8.0
Ft. Smith, Ark.*	13.5	13.5	5.0	†9.0
Little Rock	*15.5	15.5	7.0	†10.0

*Less 2½ cents to dealers. †Less 2 cents to dealers.

Standard Oil Co. (Indiana)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Chicago	13.6	13.6	4.0	8.0
Decatur, Ill.	13.0	13.0	4.0	8.5
E. St. Louis	12.3	12.3	4.0	7.8
Joliet	13.0	13.0	4.0	8.5
Peoria	13.0	13.0	4.0	8.5
Quincy	12.8	12.8	4.0	8.3
Davenport, Ia.	13.1	13.1	4.0	8.6
Des Moines	13.1	13.1	4.0	8.6
Mason City	13.1	13.1	4.0	8.6
Sioux City	12.7	12.7	4.0	8.2
Duluth, Minn.	13.7	13.7	4.0	8.8
Mankato	13.3	13.3	4.0	8.5
Minneapolis	13.4	13.4	4.0	8.9
LaCrosse, Wis.	14.8	14.8	5.0	9.3
Green Bay	14.2	14.2	5.0	8.7
Milwaukee	13.7	13.7	5.0	8.3
Madison	13.9	13.9	5.0	8.4
Detroit, Mich.	13.5	13.5	4.0	9.0
Grand Rapids	13.2	13.2	4.0	8.7
Saginaw	13.5	13.5	4.0	9.0
Evansville, Ind.	14.0	14.0	5.0	8.5
Indianapolis	14.2	14.2	5.0	8.7
South Bend	14.5	14.5	5.0	9.0
Fargo, N. D.	15.1	15.1	4.0	10.6
Huron, S. D.	15.3	15.3	5.0	9.8
Sioux Falls	14.8	14.8	5.0	9.5
K. C., Mo.*	13.2	13.2	4.0	7.7
Springfield*	13.1	13.1	4.0	7.6
St. Louis	11.2	11.2	3.5	7.2
St. Joseph*	11.8	11.8	4.0	7.3
Wichita, Kans.	11.1	11.1	4.0	6.6
Bartlesville, Ok.	12.5	15.0	5.0	7.8

*State tax 2 cents, 1-cent city tax and 1-cent Federal tax.

Effective January 1, 1933—Discounts on C.D.A. on 500 gallons or more per month throughout territory; Red Crown Ethyl Gasoline, 3 cents off tank wagon price; Red Crown gasoline, 2½ cents off tank wagon price; Stanolind Blue gasoline, 1 cent off tank wagon price. On deliveries of 75,000 gallons or more each classification allowed 1 cent additional discount.

Discounts on resellers authorized agent's agreement: Same amounts as above except made off service station price instead of tank wagon price.

Stanolex Furnace Oil in Chicago

Effective April 28, 1933, prices f.o.b. Chicago, tank wagon prices: No. 1 (36-40 lt. stw. zero), 100 gallons or more, 6¼ cents; No. 2 (30-34 stw. zero), 100 gallons or more, 5¾ cents; No. 3 (22-26 zero), 100 gallons or more 5¼ cents; No. 4 (12-16 zero), 300 gallons or more, 4½ cents. Viscosity of No. 4, 90-115 at 100° F.; No. 5, 4 cents; for less than specified quantities, add 1 cent.

Fuel Oils

Associated Distributors Prices

Spot market prices on 350 gallons or over deliveries, and top prices on contracts, respectively: 38-40, 6½ and 7½ cents; 32-36 light, 5¾ and 6¾ cents; 32-36 dark, 5½ and 6¼ cents; 28-30, 4½ and 4¾ cents; 24-6, 4¾ and 5¾ cents; 18-22, 4 and 4½ cents. On deliveries of less than 350 gallons the spot price is one-half cent higher.

Naphtha

	Tank Wagon	Tank Car
Oleum spirits	10.7	6.23
V.M.&P. naphtha	12.7	6.73
Cleaners' naphtha	13.0	9.23
Stanisol	13.0	9.23

Tank wagon prices f.o.b. Chicago, January 6, 1932. Each of above prices subject to discount of 1 cent per gallon for 150-gallon lots if covered by contracts.

Rocky Mountain District

CONTINENTAL OIL CO.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Denver, Colo.	14.0	17.0	5.0	12.5
Pueblo	14.0	17.0	5.0	12.5
Grand Jnctn.	18.0	21.0	5.0	14.5
Casper, Wyo.	16.0	19.0	5.0	10.0
Cheyenne	14.0	17.0	5.0	11.5
Butte, Mont.	20.0	23.0	6.0	17.0
Billings	21.0	24.0	6.0	15.5
Great Falls	21.0	23.0	6.0	17.0
Helena	21.0	24.0	6.0	17.0
Salt Lake, Utah	16.0	19.0	5.0	16.0
Albu'que, N. M.	14.0	17.0	*7.0	12.0
Boise, Idaho	18.5	21.5	6.0	18.0
Twin Falls	20.5	23.5	6.0	18.0

*One-cent city tax.

Central South District

STANDARD OIL CO. (LOUISIANA)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
N. Orleans, La.	15.5	15.5	*7.0	†11.5
Baton Rouge	15.0	15.0	6.0	†10.0
Alexandria	14.0	14.0	7.0	†8.5
Lafayette	15.0	15.0	7.0	†10.0
Lake Charles	15.0	15.0	7.0	†10.0
Shreveport	14.0	14.0	6.0	†11.0
Knoxville, Tenn.	19.5	19.5	8.0	12.5
Memphis	18.0	18.0	8.0	10.0
Chattanooga	18.5	18.5	8.0	12.0
Nashville	19.0	19.0	8.0	10.0
Bristol	18.0	18.0	8.0	13.0
Lt. Rock, Ark.	15.5	15.5	8.0	10.0

*Includes city tax of 1 cent. †Louisiana kerosene prices include 1-cent state tax. New Orleans kerosene price also includes 1-cent city tax.

Two-cent discount off kerosene tank wagon price and 2½ cents off gasoline tank wagon price to dealer and commercial accounts.

Nebraska

STANDARD OIL CO. (NEBRASKA)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Omaha	16.3	17.3	5.0	8.0
McCook	17.0	17.0	5.0	8.5
Norfolk	16.8	17.8	5.0	8.0
N. Platte	17.0	17.0	5.0	9.0
Scottsbluff	17.0	17.0	5.0	9.5

Note — Dealers' discount allowed as follows: Red Crown Ethyl, 3 cents off station price; Red Crown, 2½ cents off normal service station price; Nebraska Blue (third grade), 1 cent off normal service station price.

Atlantic Coast District

STANDARD OIL CO. (NEW JERSEY)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Atl'tic. City, N.J.	14.0	15.0	4.0	11.2
Newark	12.9	12.9	4.0	8.5
Annapolis, Md.	14.6	15.6	5.0	9.0
Baltimore	14.0	15.0	5.0	8.0
Cumberland	15.5	16.5	5.0	11.7
Wash'g'n, D. C.	12.2	13.2	3.0	10.0
Danville, Va.	16.7	17.7	6.0	9.9
Norfolk	15.1	16.1	6.0	10.3
Petersburg	16.2	17.2	6.0	11.4
Richmond	15.5	16.5	6.0	10.7
Roanoke	16.7	17.7	6.0	11.0
Charls'n, W. Va.	15.4	16.4	5.0	11.6
Parkersburg	14.0	15.0	5.0	10.2
Wheeling	15.0	16.0	5.0	11.2
Charlotte, N. C.	17.3	18.3	7.0	13.5
Hickory	18.5	19.5	7.0	12.7
Mt. Airy	18.4	19.4	7.0	12.8
Raleigh	18.1	19.1	7.0	12.3
Salisbury	18.0	19.0	7.0	12.6
Charleston, S.C.	16.1	17.1	7.0	10.3
Columbia	18.0	19.0	7.0	12.2
Spartanburg	15.0	16.0	7.0	12.5

Two cents per gallon discount off tank wagon price of gasoline to dealers except Washington, D. C., and Baltimore, Md., where discount is 3 cents. Kerosene 1 cent off tank wagon for 25 gallons or more under contract except New Jersey.

Ohio

STANDARD OIL CO. (OHIO)*

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Ohio points	15.5	16.0	5.0	*12.0

*Two cents off on gasoline tank wagon to dealers and commercial accounts; 2½ cents off tank wagon and kerosene to dealers.

New York and Part of New England District

STANDARD OIL CO. (NEW YORK)*

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Albany, N. Y.	15.3	16.3	4.0	9.0
New York	11.2	14.2	4.0	8.0
Buffalo	16.2	17.2	4.0	9.0
Rochester	16.4	17.4	4.0	9.0
Syracuse	16.0	17.0	4.0	9.5
Boston, Mass.	16.2	16.2	4.0	8.0
Augusta, Me.	16.7	17.7	5.0	9.0
Manch'tr, N. H.	17.4	18.4	5.0	8.0
Burlington, Vt.	18.0	19.0	5.0	8.5

*Discount schedule to commercial accounts are as follows: At service stations, 1 cent per gallon; tank wagon deliveries up to 20,000 gallons monthly, 2 cents per gallon; 20,000 to 100,000 gallons, 2½ cents; 100,000 to 300,000 gallons, 3 cents; 300,000 gallons and up, 3½ cents.

Canada*

IMPERIAL OIL, LTD.

Imperial 3-Star Gasoline

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'lds tax of	Kero. tank wagon
Hamilton, Ont.	22.5	25.5	6.0	15.5
Toronto, Ont.	22.5	25.5	6.0	15.5
Brandon, Man.	29.0	32.5	7.0	17.5
Winnipeg, Man.	26.0	29.5	7.0	17.5
Regina, Sask.	29.0	33.0	6.0	21.5
Saskatoon, Sask.	31.0	35.0	6.0	23.5
Edmonton, Alta.	29.5	33.5	6.0	22.5
Calgary, Alta.	26.0	30.0	6.0	10.0
Vancouver, B.C.	26.5	29.5	7.0	22.5
Montreal, Que.	22.0	25.0	6.0	15.0
St. Johns, N.B.	24.5	28.5	7.0	20.5
Halifax, N.S.	23.5	27.5	6.0	20.5

*Imperial gallon used in Canada.

Pennsylvania-Delaware and Part of New England

ATLANTIC REFINING CO.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Inc'l'ds tax of	Kero. tank wagon
Pittsburgh, Pa.	13.5	14.5	4.0	9.5
Philadelphia	13.5	14.0	4.0	9.0
Scranton	13.5	14.5	4.0	9.5
Allentown	13.5	14.5	4.0	9.0
Altoona	13.5	14.5	4.0	9.5
Erie	13.5	14.5	4.0	9.5
Dover, Del.	13.5	14.5	4.0	9.0
Wilmington	13.5	14.5	4.0	9.0
Epringf'd, Mass.	16.5	17.5	4.0	8.0
Worcester	15.5	16.5	4.0	8.0
Boston	15.0	16.0	4.0	8.0
Providence, R.I.	14.5	15.5	3.0	8.0
Hartford, Conn.	15.0	16.0	3.0	8.0
New Haven	15.0	16.0	3.0	8.0

Discount schedule effective November 1, 1932. In Delaware and Pennsylvania, 2 cents off station price on purchases of 2,000 gallons or more per month, in remainder of territory 1 cent. Wholesale discount 2½ cents per gallon on monthly deliveries of 20,000 to 100,000 gallons, 3 cents on 100,000 to 200,000 gallons, and 3½ cents on more than 200,000 gallons.

Pacific Coast Territory

STANDARD OIL CO. OF CALIFORNIA*

	Gasoline: Tank truck†	Gasoline: Posted retail	Kero. Incl'ds tax of	Kero. tank wagon
Fresno	19.5	18.0	4.0	14.0
San Francisco	19.0	17.5	4.0	12.5
Los Angeles	18.0	16.5	4.0	12.5
Reno, Nev.	22.5	21.0	5.0	15.5
Portland, Ore.	19.5	18.0	5.0	13.5
Seattle, Wash.	20.5	19.0	6.0	13.5
Tacoma	20.5	19.0	6.0	13.5
Spokane	23.5	22.0	6.0	18.0
Phoenix, Ariz.	22.5	20.5	6.0	‡16.0

*Retail prices posted by Standard Stations, Inc., a subsidiary.

†Above prices are at company's plant or depots as company does not operate stations. A 4-cent per gallon discount is given dealers and customers taking tank wagon lots except in Phoenix where the discount is 1 cent. ‡Includes 5-cent state tax.

TANK WAGON CHANGES

(Regular grade gasoline and kerosene)

Standard Oil Co. of New York, effective May 22, established gasoline tank wagon price of 11.2 cents and service station of 14.2 cents in New York City. Prices will not be changed in future except on move of one-fourth cent per gallon in the Gulf cargo quotations.

Magnolia Petroleum Co., effective May 5, established gasoline tank wagon price of 12½ cents and service station of 15 cents at Muskogee, Okla. Prices include 4-cent state and 1-cent Federal taxes.

Magnolia Petroleum Co. advanced kerosene one-half cent in Dallas and Fort Worth, Tex., to 7½ cents on May 20. Standard Oil Co. of New York made a general readjustment of gasoline tank wagon prices throughout its territory as shown in the accompanying table May 23.

CRUDE OIL PRICE CHANGES

Following the recent reduction of 15 cents per barrel in the price of North Lima crude, the following announcement was made by O. C. Stillman, president of Imperial Oil, Ltd., the chief purchaser of Petrolia, Ontaria, crude:

"The price of North Lima crude oil has been reduced 15 cents per barrel and the price of Petrolia crude should automatically be reduced by the same amount. In view of existing conditions in the producing fields of western Ontaria, however, Imperial Oil, Ltd., has decided not to reduce the price of Petrolia crude at the present time."

The South Penn Oil Co. advanced the price on all Pennsylvania grade crude oil effective Monday, May 22. New York, Pennsylvania and West Virginia crudes were advanced 10 cents per barrel and southeastern Ohio crude (in Buckeye Pipe Line lines) was advanced 13 cents, or from 77 to 90 cents per barrel. All other buyers met the South Penn company's advances.

Big Companies Co-operate for Highway Program

Seven major oil companies, in co-operation with motor vehicle departments of 14 states, the District of Columbia and the National Bureau of Casualty and Surety Underwriters, on May 1 started a highway safety campaign which is to extend throughout the spring and summer. Posters picturing common driving errors will form the basis of the broad appeal to millions of motorists in the states selected. They will be displayed in nearly 10,000 service stations.

The oil companies participating are: Texas Oil Co., Standard Oil Co. of New Jersey, Gulf Refining Co., Standard Oil Co. of New York, Colonial Beacon Oil Co., Standard Oil Co. of Louisiana, Standard Oil Co. of Pennsylvania and the Warner-Quinlan Co.

The campaign is the outgrowth of a similar project successfully tested in New York, New Jersey and Pennsylvania last year. From May to November, 4,500 service stations exhibited posters which attracted such favorable comment from the press and the public that it was decided to extend the movement to wider fields this year.

NATURAL GASOLINE MANUFACTURE

Gas Testing Committee Reports on Code Changes

By GEORGE BUNN
Phillips Petroleum Co.*

This report concerns the modification of the methods for testing gas for gasoline content. This modification has been rather slow in materializing but has reached the stage where it is in the hands of the printer through the auspices of the American Gas Association and first proof of the copy has already been read. It is expected now that copies of the new specifications may be available by July 1 and that the test methods will be effective immediately on their issue. The changes in the test code are not particularly radical in that the code has really been modified to conform more nearly to actual practice.

The committee has met only as necessary during the past year to properly prosecute the new issue of the code and when the pamphlets finally appear, work on all active problems before the committee will have been completed.

It may be interesting at this time to review briefly the essential changes in the code as it has previously existed:

1. The preface to the code has been revised and general typographical and technical errors have been corrected.

2. The oil absorption method of determining gasoline content has been eliminated, because it has fallen entirely into disuse.

3. The compression method of testing has been changed as follows: (a) A maximum length of thirty-five (35) feet has been specified for the condenser coil of the test apparatus. (b) The requirement for drawing the condensate from high and low stage accumulators separately, in two-stage compression equipment, has been deleted, the code now providing that the condensate from the accumulators on two-stage equipment be drawn into a common graduate.

4. The charcoal absorption test method has been modified as follows: (a) Temperatures throughout the method are now specified in Fahrenheit degrees. (b) For computing yields the temperature base has been changed to 60°F. and the pressure base to an absolute pressure of 14.4 pounds per square inch, for all gas measurements. (c) The distillation test now provides for a standard round bottom flask rather than the former side outlet Engler flask. (d) A distillation burner specification has been inserted, the provision corresponding to A.S.T.M. Method D-216 for natural gasoline distillations. (e) Condenser specifications have been changed completely. Provision is now made for a special vertical type condenser such as that more commonly employed in charcoal testing rather than for the A.S.T.M. condenser used in gasoline distillation tests. (f) The provision requiring 150 grams of charcoal in an absorption tube has been changed to read "250 cubic centimeters of charcoal." (g) All necessary drawings depicting the changes in the charcoal absorption method have been provided.

It may be mentioned that the American Petroleum Institute is now investigating the question of standardization of methods of sampling, testing, and measuring natural gas and natural gasoline, and it is to be expected that quite likely the test methods provided in the new code will become a part of such standardization.

*Report of Gas Testing Committee presented before convention of Natural Gasoline Association in Tulsa May 15-17.

Gasoline Sales Committee Reports After Year of New Specifications in Use

By S. B. CROOKS
Empire Oil & Refining Co.*

The salesmanagers committee has kept in touch with the acceptance and operation of the new vapor pressure specifications, which were in their first full year of application. In practical operation the 26-pound maximum Reid vapor pressure product has become the base grade, and each 2-pound step below 26 pounds in vapor pressure has represented a grade where the buyer's requirements demanded such grades. Prices therefore have tended to develop in 2-pound steps instead of 4-pound as originally selected. This has made the remainder of the standard grades secondary. This condition is a practical one under present conditions in the industry but indicates the absolute necessity that fractionating equipment capable of producing all grades be installed at every plant. The low prices prevailing this spring were in a large measure the result of lack of fractionating equipment which forced an excess of 26-pound material into a market of reduced volume and one desiring to purchase the lower vapor pressure grades.

There are still some refinements considered necessary in the procedure of the Reid vapor pressure test method to overcome the discrepancies which have shown up at times. No fundamental difficulty has developed in the desirability of the test, but only in the procedure. When a test procedure is placed in the hands of so many testers and the whole grading of a product is based on that test, some differences will develop in details of handling, which must be checked and a definite method set out covering all points which might influence the results.

A review of the marketing of natural gasoline shows that in some respects the past year has been most remarkable, in that the demand, which normally falls off late in the fall, continued good through the winter months until early spring. Stocks were reduced to bare working levels early last fall and production moved currently through the winter months until the time when refiners started changing to spring or summer specifications, further effected by material increases in production in the Texas Panhandle, Oklahoma City and other fields.

About this time last year a large movement of natural gasoline to jobbers had developed reaching proportions estimated anywhere from 500 to 1,000 cars per month. This cut off a like amount of the refiner's business. The force of this action, together with the growing "volatility consciousness" of the public, caused the refiners to reverse their previous policy and swing back to increasing the amount of natural gasoline used in their blending operations, thus furnishing more volatile motor fuel to their jobbers so that the latter had little incentive to blend further. This trend also required the output of the natural gasoline industry with firm prices thus removing the necessity for sales direct to jobbers.

The demand or interest in higher volatility motor fuels spread somewhat to the East Coast causing the increased buying

(Continued on Page 84)

*Report of salesmanagers committee before Natural Gasoline Association during its convention in Tulsa, May 15-17.

New Officers of Natural Gasoline Association

Officers chosen for the coming year by the Natural Gasoline Association of America included (standing left to right) Emby Kaye of Skelly Oil Co., vice president; R. C. Wheeler of General Petroleum Co. and president of California Gasoline Association, vice president; Ray Miller, secretary and treasurer; W. E. Reardon of Columbia Gasoline Corp., vice president and D. C. Williams of Continental Oil Co., president.

Bureau Explosives Issues Revision of Shipping Rules

The Bureau of Explosives has issued Supplement 6 to pamphlet No. 21 which includes changes effective July 10 of this year in regard to the rules for the shipping of natural gasoline and liquefied petroleum gases. The changes have been conveniently arranged by the bureau and have been issued as follows:

Paragraph 218 (d), page eight, amended to read as follows:

(d) All closures of openings in tanks and their protective housings must be properly secured in place by the use of a bar, wrench, or other suitable tool. Manhole covers and outlet valve caps must be made tight against leakage of vapor and liquid, by use of gaskets of suitable material, before cars are tendered to carrier for transportation. Luting materials must not be used in outlet cap or on threads of bottom outlet.

Paragraph 219, page eight, amended to read as follows:

219. Metal tanks and safety valves of tank cars listed in the table in paragraph 216 must be retested within the periods and by methods prescribed in the respective specifications. For cars listed in second column of table, retests must conform to footnotes, and to specifications for cars listed on corresponding lines in first column of table as amended. Retests of all tanks and safety valves must be certified by party making tests to owners of tank cars and to the Bureau of Explosives. Certifications must show initials and numbers of cars and service for which suitable, date of test, place of test, and by whom test is made.

Amend note, paragraph 236, page 11, to read as follows:

Note—Tanks built in compliance with American Railway Association specifications for Class 4-A tank cars authorized for use effective October 1, 1925, may be continued in service for the transportation of ethyl chloride and other liquids which do not have a vapor pressure exceeding 28 pounds per square inch at 100° F., provided there is stenciled on each side of the tank immediately below the valve protecting housing the words "Liquids having vapor pressure exceeding 28 pounds per square inch at 100° F. must not be loaded into this tank" in letters and figures at least 1 inch high. These tank cars must be retested as prescribed in current specification 104A except that safety valves must open at pressure not exceeding 35 pounds, and be vapor tight at 28 pounds per square inch.

CODE AVAILABLE SOON

Within another week copies of the code for testing natural gas for its natural gasoline content as developed jointly by the American Gas Association and the Natural Gasoline Association of America will be available at the respective association offices at 420 Lexington Avenue, New York City, and 819 Wright Building in Tulsa. The code has been compiled in a 3¾ by 6¾-inch booklet for loose leaf binding and will be sold at a nominal charge.

REPORT ON CANADIAN PLANT

CHATHAM, Ontario, May 20.—Announcement has been made by A. H. Mayland, chairman of the committee appointed by independent operators in the Turner Valley Field to determine the feasibility of a proposed gasoline absorption and carbon black plant, that a contract was being drafted and a report would be made at a meeting of independent operators. Mr. Mayland indicated his expectation that the project would be undertaken by the independent operators in conjunction with Los Angeles interests.

Gulf Coast Low Priced Gasoline Responsible for Continued Weakness in East Coast Markets

By A. E. MOCKLER
New York Bureau, The Oil and Gas Journal

Continued weakness featured the tank car motor fuel market during the past week. Below 65 octane gasoline was posted at 4¼ cents per gallon, but was moving freely at 4 to 4⅛ cents in some quarters. For gasoline of 65 octane number and above, the posted price was 4½ cents per gallon, with a few sellers quoting 4¾ cents, and the inside posted figure was being generally observed here, although it was reported that 4½ cents was being shaded fractionally at Baltimore.

In line with its new policy of pricing tank car gasoline on the basis of the f.o.b. Gulf quotation, plus transportation, handling charges, etc., the Standard Oil Co. of New York, Inc., operating subsidiary of Socony-Vacuum Corp., is now posting tank car motor gasoline of 65 octane and above at 4.85 cents per gallon, f.o.b. its Long Island City refineries, although it is still quoting 4½ cents, f.o.b. Bayonne terminal.

Although sellers at the U. S. Gulf are quoting U. S. Motor for prompt shipment at 3 cents per gallon, either domestic or export shipment, it was reported during the past week that one or more spot cargoes might be picked up at a price fractionally under that figure. Similarly with high octane gasoline, which although quoted in the open market at 3½ to 4 cents per gallon at the Gulf, was actually reported offering in cargo quantities at as low as 3¼ cents. With these low prices prevailing at the Gulf, sustained improvement in the East Coast price basis is out of the question, but rumors in marketing circles here indicate that early improvement may be looked for in quotations at the Gulf, this belief being predicated upon the theory that the flow of cheap crude from East Texas will shortly be materially curtailed.

East Coast jobbers were in the market for gasoline in car lots steadily throughout the week, influenced by the sharp rise in consumption in this area, but it was evident that the distributors were not keeping their storage full but that on the contrary they were down to almost a day-to-day basis, keeping one or more cars rolling at all times for replacements. Some jobbers are showing an interest in contracts covering their June requirements, but refiners are not anxious to book forward deliveries at today's going prices.

Tank Wagon Gasoline

A general revision of tank wagon and service station quotations in New York and New England has been made by Standard Oil Co. of New York, in conformity with the company's new policy of basing its prices on the prevailing f.o.b. Gulf quotation for gasoline in cargo lots. The revision has made for higher prices in some localities, and lower quotations in others. Revised prices for this area appear in the regular compilation of tank wagon and service station prices, elsewhere in this issue.

Kerosene

Further weakness developed in the kerosene market at refineries during the week, and prompt shipment material was reported moving in some instances at 4¾ cents per gallon, tank car lots, f.o.b. terminals, although leading refiners continued to post 5 to 5¼ cents per gallon for this oil. Demand was fairly active, but sharper competition incidental to lower crude oil costs was tending to depress the price structure.

Tank wagon kerosene business was holding up fairly well throughout the week, and marketers were quoting prices unchanged in retail markets.

Furnace Oil

Refinery demand had eased off sharply, due to the warmer weather, and tank car movement was extremely limited. The same held true of the tank wagon market, quotations remaining unchanged in both instances.

A cargo of approximately 75,000 bbls. of 32-36 furnace oil was reported sold at the Gulf during the week, for tanker shipment to New York, June loading, at 2¾ cents per gallon, f.o.b.

Aviation Gasoline

There has been some quickening in aviation activities reported in the East, and refineries and terminals in the New York Harbor district are getting a more active tank car movement. For prompt shipment refiners are quoting fighting grade aviation gasoline at 10½ to 11 cents per gallon here, with tank wagon quotations ranging 15 to 16 cents per gallon.

Bunker Oil

Continued curtailment in receipts of bunker fuel oil from Mexico and South America has tended to further strengthen the position of the market in this area. Refiners continue to post 75 cents per barrel, f.o.b. terminals, (70 cents to contract buyers operating ocean-going steamships out of New York Harbor) and the market tone remains strong.

In the face of demoralization and price weakness in markets for other refined products, bunker oil traders doggedly cling to the belief that the posted price for this oil will move upward during the next few months.

There has been some improvement in the marine demand for bunker oil during the week, and refiners report that contract withdrawals are running fully up to expectations for this season of the year. The withdrawal of the Leviathan from service, however, has cut materially into the tonnage of one supplier.

Diesel Oil

Refiners report that there has been a little improvement in the marine consumption of Diesel oil at Atlantic Coast ports during the past few weeks, and the market tone is somewhat improved. Refiners continue to post $1.65 a barrel, bulk, at principal East Coast terminals, for this oil. Domestic consumption is also picking up somewhat, and the market holds steady at 4 cents per gallon for 26-30 gravity oil, tanker lots, f.o.b. refineries or terminals.

Gas Oil

Industrial consumption of gas oil is reported to be holding up fairly well, and refiners continue to post 4 cents per gallon for 28 gravity minimum oil, in tank car lots, f.o.b. terminals. Most of the contract deliveries of gas oil are moving out at this level, and there is not enough spot business offering to make this market very attractive for the price cutters.

Paraffin Wax

Domestic consumers were in the market to a greater extent during the past week, and new business booked for prompt and June shipment was reported to have increased considerably over recent levels. The firm price undertone, coupled with the general expectation of firmer markets, has tended to induce many consumers to stock somewhat in advance of actual requirements, a condition reminiscent of better days in the industry.

Export buying of paraffin wax, both crude scale and fully refined, has also picked up during the past week, although much of this business has gone to the Gulf, where prices have been more attractive in some instances. Spot 130-132 a.m.p. for export was offered during the week at 3.25 cents a pound, a quarter cent reduction, with 133-135 a.m.p. quoted at 4 cents, likewise a drop of one-quarter cent per pound. Other grades remained steady and unchanged.

Petrolatum

Pharmaceutical and cosmetic manufacturers were taking petrolatum in better volume last week, and the market undertone remained firm, although no actual price increases were made effective during the period. Export buying of petrolatum continued along curtailed lines.

Lubs

The week witnessed one price reduction on cylinder oils and two advances. Spot 600 s.r. unfiltered was advanced a half cent to 16 cents per gallon, with 630 flash s.r. up a corresponding amount to 26 cents per gallon, while 600 flash s.r. was quoted one-half cent lower at 19½ cents. Quotations on other grades remained unchanged. Refiners reported a fair export demand for lubs, although gallonage in most instances was not up to recent levels.

In the domestic field, there has been a considerable increase in the call for cylinder oils, particularly bright stocks. Marketing of "gyp" lub oils, however, still tends to upset the retail price structure, and has greatly intensified the competitive situation at service stations. Leading refiners and marketers are showing a stronger tendency toward the sealing of all of their branded lubs sold at retail, to protect motorists against substitution.

Exports and Imports of Refined Products; Receipts of California Oil in the East

NEW YORK, May 22.—Widely divergent price views made for quiet trading in the Gulf export market during the past week, and aside from a number of intercompany shipments which were reported arranged, the market showed little activity, and prices had again weakened.

Buyers were reported in the market for prompt loading crude for export at around 52 to 53 cents per barrel, but with the lowest asking price of suppliers reported to be 62 cents a barrel, traders failed to get together. Reports of premiums in the field for prompt shipment oil, together with the disclosure that a number of wells are being closed in in some fields as a result of current low price levels, tended to stiffen sellers' views. French buyers are reported well covered on their requirements up to the end of June, but an early resumption of trading in export crude for late June/July lifting is looked for.

Petroleum Exports

The following table shows exports of principal refined petroleum products reported from the port of New York during the three weeks ended May 13 (all figures in gallons unless otherwise noted):

	Week ended		
	May 13	May 6	April 29
Gasoline	50,000	71,000	325,000
Naphtha	265,000	627,000	6,000
Kerosene	.....	12,000	38,000
Fuel and gas oil	30,000	280,000	1,000
Lubricating oil	1,140,000	5,190,000	1,130,000
Petroleum, ref.	215,000	230,000	190,000
	Pounds		
Petrolatum	.....	.....	35,000
Paraffin wax	2,650,000	2,721,000	2,792,000
Refined	390,000	265,000	172,000
Scale	240,000	.....	210,000
Lub. grease	670,000	910,000	435,000

Reports of a firming up in the Rumanian export market, coupled with the stronger price outlook for American refined oil products for export, tended to bring out more foreign inquiry for refined products during the past week, and operators here reported some improvement in business for prompt and nearby shipment oil.

Imports

Imports of crude and refined petroleum during the week ended May 13 showed a slight upswing, totaling 823,000 bbls. a daily average of 117,571 bbls., compared with 541,000 bbls., or 77,286 bbls. daily, during the previous week, and a daily average of 122,179 bbls. for the four weeks ended May 13. All of the week's imports were at Atlantic Coast ports, as follows:

	Bbls. of 42 gals.
Baltimore	132,000
Boston	68,000
New York	344,000
Philadelphia	279,000
Total	823,000
Daily average	117,571

The week's imports consisted of 279,000 bbls. of crude petroleum and only 25,000 bbls. of fuel oil, this substantiating recent reports in importing circles that a sharp cut in the inward movement of foreign fuel oil was in progress.

California Oil Receipts

There was only one cargo of California oil received at Atlantic or Gulf Coast ports during the week ended May 13, this consisting of 25,000 bbls. of kerosene laid down at New York. This was a daily average of 3,571 bbls. for the week, and compared with 380,000 bbls., a daily average of 54,286 bbls., for the previous week, and a daily average of 39,929 bbls. for the four weeks ended May 13.

It is reported that intercoastal movement of California gasoline will be sharply curtailed during the summer months, due to the sharp competition in eastern markets furnished by low-priced East Texas gasoline. California refiners are expected to ship kerosene, fuel oil and gas oil eastward in fair volume during the near future, however, to round out the requirements of East Coast refiners, who continue to operate their refineries at approximately only 75 per cent of rated capacity.

Trend Toward Narrow Margins in Wholesale and Retail Markets Continues in Middle West

By R. C. CONINE
Chicago Bureau, The Oil and Gas Journal

CHICAGO, May 22.—The reconstruction program for the retail and wholesale gasoline markets in the territory Monday appeared to substantiate predictions made in The Oil and Gas Journal during the past three weeks, particularly in the matter of reductions in quantity discount allowances to dealers, and elimination of special discounts at the service station. The conviction that Standard Oil Co. (Indiana) has definitely adopted the policy of basing tank wagon and service station prices on the Group 3 tank car gasoline markets is being strengthened by the greatly increased interest the Indiana company is taking in the gasoline tank car open markets. Now that Standard is basing its retail prices on the Oklahoma gasoline tank car markets, the trade contends, the Standard company is certainly not going to be content with the minor role it has held in the tank car spot markets in the past. The Indiana company is expected to participate actively in the open markets, brooking underselling practices as little in the tank car markets as it has in the service station and tank wagon markets.

Standard Outlines Plan

Allan Jackson, vice president in charge of marketing of Standard Oil Co. (Indiana), expresses the viewpoint of his company in regard to the condition of the oil business and proper remedial action in an article appearing elswhere in this issue.

On May 20 the Standard company mailed out cancellation notices of its present discount agreements on gasoline for commercial trade, service station deliveries, to be effective May 26. It is also planned to send out cancellation notices on discount allowances made off the tank wagon to consumers of 500 gallons or more a month (not resellers) to be effective May 31. The new memorandum of agreement at reduced discounts will be effective June 1.

Opinions in the Trade

In Chicago district marketing circles it is believed that the program contemplated by the Indiana company is largely dependent upon the attitude other companies may take, and is amenable to competitive influence in quite a different way than many of the pessimistically inclined anticipated. It is not believed that the Indiana company will attempt to ram a reconstruction program down the throat of the industry; rather, it is the consensus of opinion that Indiana is planning to put into practice the essential tenets of sane marketing heard so often at meetings and will feel its way carefully, testing each step, to avoid chaos.

Q.D.A. Reductions

In view of the fact that May 20 was the deadline for sending out cancellations of existing quantity discount allowance agreements off the tank wagon to resellers (dealers, including AAA's), to be effective next month, the trade believes that the Standard company will study the effects of the moves it has already made before reducing these discounts. The memorandum of agreement, tank wagon deliveries (to resellers) contains the following clause: "This contract may be canceled by seller at the end of any calendar month on 10 days previous written notice to buyer."

Expressions by Indiana officials, and observations of market students, however, point to the following new quantity discount arrangements for dealers. Amounts off the tank wagon normal posting: In metropolitan Chicago area: 1½ cents on the third grade, and 2½ cents off on the regular and premium grades, plus the usual rental of one-half cent a gallon on each. The present Q.D.A.'s in the area are: 4 cents on Ethyl, 3½ cents on the regular grade, and 2 cents on the third grade, plus one-half cent rental.

Outside of Chicago metropolitan area the new schedules are expected to be: 1 cent on the third grade, and 2 cents on the regular and premium grades, plus one-half cent a gallon rental. In the present schedule the discounts are 1½ cents on third grade, 2½ cents on regular and 3 cents on the premium grade, plus one-half to 1-cent rental.

Developments of this week will undoubtedly reveal much that has been guessed at in connection with the reception these innovations will receive at the hands of other major and semimajor oil companies. Mr. Jackson suggests the appointment of a referee to handle situations which are bound to arise in connection with 5-cent and 6-cent marginal guarantee contracts made by refiners for period of a year or more.

A development which may soon gain considerable influence in the gasoline tank car markets in the territory pertains to the spreads between the low and the high octane materials. One major company is apparently recognizing two grades of gasoline, that which is below 65 octane number, and that which is above 65 octane number. This company is offering 65 octane (C.F.R. Motor Method) gasoline at the low of the low octane gasoline price appearing in two daily publications, and offers the third grade gasoline in the tank car market at a quarter of a cent under the price named for the 65 octane gasoline. Purchasers and prospective purchasers of the 65 octane gasoline say that the refiner promises to raise the octane number to 70 in June.

Look for Stiff Advances

While on the face of it there is little encouragement in this policy of basing prices on the low of the low octane gasoline, it is certain that if this becomes a permanent policy a considerable portion of the straightrun gasoline will go to reforming units to improve the antiknock rating, and proportionately less gasoline will be produced, as has been pointed out in The Oil and Gas Journal by W. T. Ziegenhain in recent issues covering the trend in motor fuels.

Major company representatives appear to be confident that by the middle of June the low of the low octane tank car gasoline price will be close to 4 cents, Group 3. This would represent quite a jump above the current published low of 2 cents, and the reported lows of 1¾ cents heard in the trade.

The third grade gasoline offered by at least three major companies in Chicago falls into the middle octane gasoline group, but instead of selling at the 2⅝ cents to 2⅞ cents prices given in certain daily price publications, the material is offered at 2 cents, Group 3, in the spot markets. Contract business, due to the recent downward revision in the tank wagon markets, is going at a much lower figure with most of the companies selling at their stop-clause prices, usually 1.19 cents a gallon, Group 3. Certain refiners who have less favorable contracts are delivering gasoline at half a cent or less a gallon, Group 3. However, there is a strong tendency to raise the Group 3 markets, and, as pointed out above, prices are expected to advance to nearly double their present figures.

Gasoline Tank Car Markets

The gasoline tank car markets, for reasons pointed out above, show a slight narrowing in the differentials existing among the three octane grades. Otherwise, price levels are considered on the bottom and due for a rapid advance. Low octane gasoline was unchanged at 2 cents to 2¼ cents, while regular grade and premium grade moved down an eighth of a cent to ranges, respectively, of 2¼ cents to 2½ cents, and 2½ cents to 2¾ cents. One other change was in the high of the 60-62, 400 endpoint gasoline, low octane, which dropped an eighth of a cent to make a range of 2⅛ cents to 2¼ cents.

Naphtha Outlook Unfavorable

A few refiners who cannot hope to, and do not expect to sell more than a comparatively minute proportion of special naphthas marketed in the territory, are selling these few cars of material at prices far below what is considered a fair price. One Oklahoma producer of special naphthas, an important factor in these markets in the territory, reveals that gasoline producers are naming such low prices on their incidental cuts of ordinary paint and cleaning naphthas that the alternative of the naphtha manufacturer is to cut less special naphthas and go into the gasoline business in order to protect what is left of the naphtha markets. A major refiner is expected to an-

(Continued on Page 31)

Do You Remember?

From The Oil and Gas Journal Files

25 Years Ago

May 25, 1908

It is estimated that the Glenn Pool, in Oklahoma, produced 35,065,937 bbls. of crude oil up to May 1, 1908. It was discovered late in 1906 but the discovery well was not put on production until the spring of 1907.

The Heywood Oil Co., which started in Texas and spread out into Oklahoma, recently took a flyer in the Illinois Field and completed a good well in Lawrence County.

The Union Oil Co. of California increases its capital stock from $10,000,000 to $50,000,000.

Much interest is expressed in California oil circles in the arrival of a Texas Gulf Coast rotary outfit which will be tested out in the Coalinga Field by a Texas drilling crew.

The Texas Company has launched its tanker, "Texas," which has a capacity of 47,500 bbls. of refined oil, or 56,000 bbls. of crude oil.

Among the prominent members of the Gulf Coast Oil Producers Association are W. S. Farish, I. R. Bordages, J. C. Wilson, E. L. Bradley, Winslow Robinson, R. L. Young and R. Lee Blaffer.

20 Years Ago

May 20, 1913

J. S. Cosden, of Southwestern Refining Co., announces the purchase of 110 acres of land in West Tulsa on which the company will build a refinery with a crude oil capacity of 4,000 to 6,000 bbls. per day. The company already has a refinery in Bigheart, Okla.

The Indian Territory Illuminating Oil Co. is fighting with the Department of the Interior for the right to renew its lease on 680,000 acres of Osage lands in Oklahoma.

Standard Oil Co. of Louisiana's No. 18 Stiles, in the Caddo, Louisiana, Field, producing 18,000 bbls. per day, catches fire, and 60 boilers are in operation supplying steam with which to fight the fire.

10 Years Ago

May 24, 1923

Harry F. Sinclair's "Zev" wins the Kentucky Derby, and J. S. Cosden's "Martindale" is a close second, before the largest crowd ever to have witnessed the racing classic. The race netted Mr. Sinclair $53,625 and Mr. Cosden $6,000.

J. F. Mallory, pioneer oil operator in the Eastern fields, dies at his home in Waterford, Pa.

Mid-Continent crude oil gravity schedule ranges in price from $1.10 to $2.20 per barrel; with 36 gravity oil at $1.60. Pennsylvania Grade oil ranges from $1.85 in southeastern Ohio to $3.50 per barrel in the Bradford and Alleganey Fields. Service station prices for gasoline are: Tulsa, 18 cents per gallon; Chicago, 22 cents; New York, 25 cents; and Los Angeles 19 cents. There was no tax.

William Hasson, who made the first shipment of oil from the field around the Drake well in Venango County, Pennsylvania, died recently in Oil City, Pa.

William S. Barnickel, inventor of Tret-O-Lite, died in St. Louis, Mo.

Construction work begins on the Roxana Petroleum Corp.'s refinery at Arkansas City, Kans.

Oil Brightens Outlook of Conroe, Tex., District

(Continued from Page 11)

this increase was only slightly greater than the increase in population. Doctor Ingrum deplored the county's lack of modern health agencies and expressed the hope that the bigger revenues in prospect would permit correction of this deficiency. There is no hospital in Montgomery County aside from a small private sanitarium and the camp hospital conducted by the Humble Oil & Refining Co. on its lease at Conroe Field. There is no county physician and no city physician. There are no facilities for taking care of insane patients. "We simply have to keep them as best we can until they die," said Doctor Ingrum.

Facilities for the care of prisoners are inadequate, though additional cells have been installed and other improvements made in the jail used jointly by the city and the county. It is believed that within a relatively short time the increased revenues from taxation will remedy all this.

Fewer Policemen Needed

That there has been improvement in the matter of law violations is evidenced by the fact that whereas eight policemen were required in Conroe last winter, only four are needed now.

It is of interest to note that some of the Montgomery County pioneers who dreamed of oil died near the time G. W. Strake proved the trustworthiness of their dreams. C. T. Darby, who died the very week the discovery well was brought in, was an early postmaster of Conroe, later a county commissioner, and for about 20 years was justice of the peace and mayor. He was firm in the belief that oil underlay this region. J. T. Rucks, who was among backers of several test wells that found no oil, died three years ago. James McDade, who died about six months ago, wrote in 1923, commenting on various unsuccessful drilling ventures in this district: "And so it goes. Drilling all around what I believe is the greatest oil pool in the world, but afraid to touch the middle. You can look for oil wells all around us in the not far distant future."

M. C. Kelley, still a resident of Conroe, promoted a half dozen attempts to find oil in Montgomery County, all failures. And when oil eventually was discovered he had no holdings in the productive territory. Conroe was named for Isaac Conroe, a pioneer sawmill operator and an early postmaster of the town.

Car Manufacturers Could Help Solve Vapor Problem

(Continued from Page 8)

peratures. On the other hand, for a given fuel being used in two cars having the same fuel line temperatures under given operating conditions, the car with a fuel system having the higher vapor-handling capacity will have greater freedom from vapor lock troubles. With any given fuel, both fuel line temperatures and vapor-handling capacity must be taken into consideration.

The vapor pressure characteristics of the fuel affects the vapor locking tendency in two respects. For two fuels having the same Reid vapor pressure used in a fuel system with a high vapor-handling capacity, the fuel showing the greater decrease in vapor pressure on evaporation will have the smaller vapor locking tendency. On the other hand, for similar changes in vapor pressure on evaporation, the fuel with the higher Reid vapor pressure will have the greater vapor locking tendency. Both the Reid vapor pressure and the change in vapor pressure with evaporation in the fuel lines must be taken into consideration.

These various phases of the general problem are considered in detail in the paper, and a summary of the information is given in the following sections of this abstract.

Fuel Line Temperatures

With a well stabilized gasoline, the balance between ease of engine starting and freedom from vapor lock is controlled by the temperatures reached by the gasoline in the fuel feed system. For any reasonable balance, fuel line temperatures must be very close to the atmospheric temperature. In 1930, fuel temperature measurements were made in 27 cars of 1930 model or earlier operated under various conditions, while in 1931, 47 cars of current model were run. Under a typical set of operating conditions (40 m.p.h. constant speed), the average temperature rise at the point of vapor lock was 31° F. above the atmospheric temperature. Improvements had been made in many of the 1931 cars but the average temperature rise was not decreased. In these two sets of runs, a gasoline was used which would not vapor lock. Later measurements indicated that the temperature rises were on the average 8° F. higher than would have been obtained under vapor locking conditions making the average rise 23° F. In 1932, 46 cars were run and temperature measurements made under vapor locking conditions, the average temperature rise being 23° F. For protection for the majority of cars on the road, a temperature rise of 33° F. must be assumed at an atmospheric temperature of 80° F., and recent runs have indicated that this will be about 43° F. at an atmospheric temperature of 30° F. These temperature rises are much higher than are necessary and fuel systems can be designed and installed which will show much lower values.

Vapor-Handling Capacity

Each fuel system has a definite capacity for handling vapor which varies with the operating conditions but does not depend upon the type of fuel used. When vapor lock occurs, sufficient vapor has been formed to reach the limiting capacity of the system. The vapor-handling capacity of the fuel system can be evaluated from temperature measurements at the time of vapor lock and from vapor pressure data on the fuel used. If a series of vapor pressure bombs, analogous to the Reid type but with various ratios of vapor to liquid volume, are employed and if the temperature is found at which the pressure is 14.7 lb./in.^{2} with each bomb, then a curve can be drawn for the given fuel showing the vapor locking temperature for various ratios of vapor to liquid volume. Using the observed temperature at the time of vapor lock with this fuel, the corresponding ratio of vapor to liquid volume can be obtained from the curve and this ratio can be taken as the vapor-handling capacity of the fuel system.

During the past summer, vapor lock road tests were made on 46 cars operated under various conditions on one type of fuel of measured vapor pressure characteristics. A number of cars were found to have practically no capacity for handling vapor, whereas four of the cars were capable of handling 40 to 50 volumes of vapor per volume of liquid. Over half of the cars had vapor-handling capacities between 10 and 30. In order to afford protection to the majority of cars on the road, it is necessary to assume, however, a very low capacity for handling vapor.

Vapor Pressure Characteristics

The change in vapor pressure with change in the ratio of vapor to liquid volumes varies considerably with different fuels. Hence two fuels may have the same Reid vapor pressure, but if used in a fuel system having a large capacity for handling vapor, their vapor locking temperatures may be quite different. In general, the flatter the distillation curve at the 10 per cent point, the less will the vapor locking temperature change with evaporation in the fuel lines. When the vapor-handling capacity of a fuel system is known, the vapor locking temperatures with different types of fuels can readily be predicted if their vapor pressure characteristics are known. Some data have been obtained in cars on the road which verify this conclusion, and further work is planned for the coming summer in order to obtain conclusive evidence on the point.

Permissible Vapor Pressures

In obtaining an estimate of the vapor pressures which are permissible in cars on the road at present, three averages must be considered. Full line temperatures, vapor-handling capacity and fuel characteristics all vary over wide limits. In order to protect the majority of cars from vapor lock troubles, greater weight must be given to the higher fuel line temperatures, to the lower vapor-handling capacities and to the fuels which change little on evaporation. Taking these into consideration it is believed that the permissible Reid vapor pressure at temperatures below 100° F. is 8 lb./in.^{2}, and at temperatures below 75° F. is 12 lb./in.^{2}.

Economic Committee Estimates Consumption

(Continued from Page 12)

fuel from refinery centers to distributing points was abnormally large. It is believed that approximately 5,800,000 bbls. in excess of normal were shipped but not fully absorbed until the end of the third quarter of the year. For comparable purposes and to develop a more logical trend, arbitrary adjustments of the 1932 figures for June, July, August and September have been made in 'Motor Fuel Demand and Stocks.'

"Should the suggested Federal legislation requiring the blending of alcohol with gasoline ultimately be enacted into law, the demand for refinery gasoline would be affected to the extent of the blend required. Moreover, the demand for crude oil would be reduced by more than twice the quantity of alcohol blended. This report does not give consideration to such a possibility."

TABLE 4—FORECAST OF DEMAND, PROBABLE STOCKS AND REQUIRED SUPPLY OF GAS AND FUEL OIL

April 1, 1933, to Sept. 30, 1933 (forecast), vs. April 1, 1932, to Sept. 30, 1932 (actual)

		Second quarter 1933		Third quarter 1933		Six months	
		Total	Per cent change	Total	Per cent change	Total	Per cent change
		(In thousands of barrels)					
DEMAND:	Total	75,500	—3.3	74,400	+6.9	149,900	+1.5
	Domestic	71,000	—1.1	70,000	+6.6	141,000	+2.6
	Exports	4,500	—28.6	4,400	+12.2	8,900	—13.0
STOCKS:	Change during period	+4,100	...	+5,200	...	+9,300	...
	Beginning of period	123,825	...	127,925	...	123,825	...
	End of period	127,925	...	133,125	...	133,125	...
SUPPLY:	Total	79,600	—5.1	79,600	+4.4	159,200	—0.6
	From imports	3,700	—47.1	3,500	+1.7	7,200	—31.0
	From domestic	75,900	—1.3	76,100	+4.5	152,000	+1.5
	Refinery production	73,600	—2.7	73,800	+3.7	147,400	+0.4
	Transfer from crude (California)	2,300	+34.6	2,300	+42.9	4,600	+61.1
PROBABLE YIELD FROM CRUDE..		36.2%		35.8%		36.0%	

TABLE 5—1932 TRENDS OF MOTOR FUEL DEMAND

Domestic Demand Adjusted to Compensate for Effects of Federal Tax

	Domestic demand	Exports	Total demand
January	26,411,000	3,422,000	29,833,000
February	25,683,000	2,849,000	28,532,000
March	29,397,000	3,039,000	32,936,000
April	31,608,000	3,810,000	35,418,000
May	32,419,000	4,610,000	37,029,000
June	34,216,000	3,521,000	37,737,000
July	35,942,000	2,363,000	38,305,000
August	36,131,000	2,366,000	38,497,000
September	34,746,000	2,735,000	37,481,000
October	33,785,000	2,379,000	36,164,000
November	30,231,000	2,387,000	32,618,000
December	27,334,000	1,953,000	29,287,000
Total	377,403,000	35,434,000	412,837,000

New Policies Covering Marketing Practices

(Continued from Page 10)

in the trade press for years are going to become the subject of action.

Co-operative Planning

Under the "new deal" that we are hearing so much about, there is some prospect that provision will be made for representatives of the oil industry to get together and talk things over with less restriction than in the past. It is impossible to do constructive planning for the industry unless such conferences can be held. If we are granted privileges of that order it may become possible to have state or regional umpires with whom information can be filed. For example, with such umpires might be filed copies of contracts which cannot be changed to accord with new conditions, and competitors would then be able to learn exactly about them and understand the difficulties involved. Such umpires might become sources of information relative to price conditions and provide a clearing agency for charges of violation of marketing policies.

The thoughts set forth in the accompanying statement embody ideas of desirable changes in marketing policies which we should like to put into effect in connection with our own marketing but are prevented from adopting because of the competitive situation. We have gone so far as to decide that we shall try one of the steps by mailing out on May 20 notices to our customers of cancellation of our present discount agreements on gasoline for commercial trade, service station deliveries. We plan to make our cancellation effective May 26. We also plan to send out cancellation notices on all of our memorandum of agreement—tank wagon deliveries, to be effective at the close of business May 31. The new memorandum of agreement at reduced discounts will be presented to be effective June 1. This form of agreement is used with consuming tank wagon accounts taking 500 gallons or more per month. The discount is off the tank wagon market. This form of agreement is not made with resellers. If changes in the competitive situation permit we are likely to take other steps along the lines I have outlined. Success or failure in making adjustments in marketing policies which have long been recognized as due and necessary in the interest of sound business is wholly dependent on whether the competitive situation favors them.

The events of the last few weeks have brought the industry low, but we may all look back to them in the future as the decisive means by which we were moved finally to steps toward a sound future for the marketing of petroleum products.

Overtaxation Big Cause of Oil Industry's Ills

(Continued from Page 6)

year alone the decrease of consumption in the highest taxed state was almost 9 per cent greater than in the lowest taxed state. The current year thus far shows a steady continuance of the heavy loss ratio. Further, sales and registration of cars have fallen sharply, the losses being progressively greater where and as gasoline taxes are higher. Thus not only the oil business but the automotive and all allied industries have suffered together. Few people realize how disastrous to an industry is a 100 per cent manufacturer's tax; it is so easily evaded and certain to be made the means for wrecking prices and destroying a legitimate industry. The business profits from the operation of the oil and automotive industries are distributed among almost countless other industries which provide materials and supplies. A moderate sales tax equitably affecting all these, would produce more revenue, without seriously affecting any other industry. Such a sales tax is not a burden on industry or the people. But concentrating taxation on a single article—gasoline—the burden is so lopsided that it invokes the irrevocable law

of diminishing returns. In 1929, the entire oil industry, reported a profit of $415,000,000 in which practically every company shared. In 1930, the same companies showed only $208,000,000 profit. In 1931 a large majority showed losses, a few profits. Net losses for the entire industry were over $84,000,000. There were further heavy deficits in 1932; and 1933 has inaugurated a new record of losses; ten companies which have reported for the first quarter all show losses aggregating $14,504,000. The same companies in the full year 1932 had net earnings of $22,945,000.

"In the face of such accumulative losses, chiefly attributable to taxation excesses, the threat of another one cent federal tax brings the industry face to face with bankruptcy. That catastrophe would be only less disastrous to a multitude of industries closely linked to oil and motor activities. In the end it would more than offset all possible benefits from the public works program.

"We submit this statement to the administrative and legislative authorities at Washington, urging that no further burden be imposed on this industry. We ask that the present federal gasoline tax be dropped. And we urge that a manufacturer's sales tax of general incidence be substituted for the present oppressive and discriminatory excise taxes on a few commodities."

See Expanding Outlets for Heavier Products

(Continued from Page 9)

sion of the problem of increasing vapor pressures in commercial grades of gasoline. At present government purchases prescribe maximum specifications in the matter of vapor pressures and these are generally followed by refiners in sales through their own stations and to jobbers.

An attempt has been made during the past year to secure the co-operation of car manufacturers in designing their fuel systems so that fuels of higher vapor pressures can be used without danger of vapor lock in operation. It was stated that some manufacturers have ignored these suggestions while others now have fuel systems which permit an increase in present vapor pressures of from 2 to 4 pounds. This is important to refiners because of the direct relationship of volatility to plant yields and also higher octane ratings in the finished motor fuels. The committee plans to lay special stress the coming year to secure greater co-operation from the car manufacturers.

Declining Consumption

Emphasizing the direct relationship of future gasoline consumption and tax rates, Sidney A. Swensrud, of the Standard Oil Co. of Ohio, presented an unusual study of this problem. In regard to the state rates, Mr. Swensrud found:

"(a) Those states which had the highest gasoline taxes in 1932 suffered the greatest declines in consumption, and those that had the lowest tax rates suffered the smallest declines. And this conclusion is not altered by eliminating from the comparison those states that apparently suffered a greater or less decline in economic status relative to earlier years than did the country in general.

"(b) The states which increased their rates of tax after 1929 experienced a definitely lower trend of sales thereafter than did the states which had approximately the same average tax rates in 1929, but which did not further increase those rates thereafter. Furthermore, with each succeeding year, the difference in the rate of progress between the two groups has become more marked; the losses of the states with increased taxes relative to those that did not increase their taxes have become greater with each passing year, thus indicating that the adverse effect of increased tax rates is cumulative.

"(c) Of each group of states that had the same actual tax rate in 1928, the members thereof which later increased their rates in subsequent years showed a markedly smaller gain over 1928 than did the states which kept their tax rates at the 1928 level. And in each case the members of the original groups that had increased their tax the most suffered the greatest declines relative to the average for their group as a whole.

"(d) That, on the average, the states that increased their tax rates 1 cent per gallon from 1928 to 1932 suffered a relative loss in sales of approximaetly 5 per cent as compared with the states that made no change; and the states that increased their tax rates by 2 cents per gallon suffered a relative loss in sales of from 13 to 14 per cent as compared with the states that made no increases after 1928."

Exchanging of Views Made A.P.I. Profitable

(Continued from Page 6)

dustry in an effort to aid the state officials. So instead of criticizing these gentlemen, let us see if we can't do a better job ourselves, and when we get our own house in order, when we can say that we have done the job, then we can hope for them to follow our leadership.

"I also want to suggest a broader co-operation, and that is a co-operation of this industry with the President of the United States. He has sent to Congress a bill known as the National Industrial Recovery Act, which is applicable to all industries, including ours. It is an effort on his part, as he stated at the Chamber of Commerce meeting in Washington, to bring the Government into partnership with industry.

"It is proposed by this bill that our industry and every other industry in the United States may regulate itself. It is not proposed to force regulation on us. It is to give us an opportunity, without the restraints of the antitrust laws, to solve our own problems. Whether we can do it or not remains to be seen. But, at all events, let us co-operate with ourselves and with his agent, whoever he may be, in an effort to solve our problem."

Trend Toward Narrow Margins in Markets

(Continued from Page 29)

nounce slashing cuts in the naphtha tank car markets before June. This refiner has been quoting delivered prices, but the point has been reached, it is reported, where this refiner is preparing to meet all competition on a Group 3 basis. Another Chicago district refiner is offering Chicago delivered prices of 6¾ cents on V.M.&P. naphtha, and 5¼ cents on petroleum spirits. This represents a cut of nearly three-fourths cent on the V.M.&P. naphtha, and more than 1 cent on the petroleum spirits. Other sources are offering cleaners and Stoddard at similar cut price rates. For this reason it should not be surprising if the prices shown on the Refinery Price page of this issue are reduced anywhere from half a cent to more than a cent shortly. However, there is a small ray of hope that producers will speedily take cognizance of the direction in which they are wending.

Kerosene Tank Car Markets

Kerosene tank car markets are reflecting the adverse weather conditions which have retarded farm work. Prices were within a narrower range, moving down from the top one-eighth of a cent. The 41-43 water white kerosene is offered at 2½ cents to 2⅝ cents, and the 42-44 water white material is quoted at 2⅝ cents to 2¾ cents. Distillates and fuel oils are dull and unchanged in price. There is little demand for U.G.I. gas oil.

Refined Wax Prices

Refined waxes advanced a tenth of a cent a pound down the list, reflecting lower stocks and improved demand. Export business is reported stronger.

California Crude Oil Prices

STANDARD OIL CO. OF CALIFORNIA
(Effective March 5, 1933)

For current purchases of crude oil at the well (unless otherwise specified). (All gravities above those quoted take highest price offered in that field.)

Gravity—	Long Beach	Seal Beach, Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Olinda, Brea Canyon	Athens-Rosecrans	Torrance	Richfield	Whittier	Montebello	LaHabra, Coyote	Santa Fe Springs	Midway-Sunset, Elk Hills, Buena Vista Hills	Lost Hills	Coalinga
14-14.9	$.55	$.55	$.55	$.55	$.55	$.55	....	$.55	$.55	$.55	$.55	$.55	....	$.49	$.49	$.49
15-15.9	.55	.55	.55	.55	.55	.55	....	.55	.55	.55	.55	.55	....	.49	.49	.49
16-16.9	.55	.55	.55	.55	.55	.55	....	.55	.55	.55	.55	.55	....	.49	.49	.49
17-17.9	.55	.55	.55	.55	.55	.55	....	.57	.56	.57	.55	.55	....	.49	.50	.49
18-18.9	.57	.55	.61	.61	.60	.61	....	.59	.58	.59	.55	.57	....	.49	.52	.49
19-19.9	.59	.57	.63	.64	.62	.64	....	.61	.61	.61	.56	.59	....	.49	.54	.49
20-20.9	.61	.59	.64	.67	.64	.66	....	.63	.63	.63	.55	.61	....	.52	.56	.49
21-21.9	.63	.62	.66	.69	.66	.68	....	.64	.66	.65	.55	.63	$.57	.55	.58	.51
22-22.9	.65	.64	.68	.71	.69	.70	....	.66	.68	.67	.57	.65	.59	.57	.60	.53
23-23.9	.67	.67	.70	.73	.71	.72	....	.68	.70	.69	.60	.67	.62	.59	.62	.55
24-24.9	.69	.69	.72	.75	.73	.73	$.65	.70	.73	.71	.62	.69	.64	.61	.63	.57
25-25.9	.71	.73	.74	....	.75	.75	.68	.73	.75	....	.65	.71	.66	.66	.65	.59
26-26.9	.73	.74	.75	....	.77	.77	.70	.75	.77	....	.68	.73	.69	.63	.67	....
27-27.9	.75	.76	.77	....	....	.79	.73	....	.80	....	....	.74	.71	.71	.69	....
28-28.9	.77	.79	.79	....	....	.81	.75	....	.82	....	....	.76	.73	.74	.71	....
29-29.9	.79	.81	.81	....	....	....	.78	....	.84	....	....	.78	.76	.76	.73	....
30-30.9	.81	.84	.83	....	....	....	.81	....	....	....	....	.80	.78	.79	.76	....
31-31.9	....	....	....	....	....	....	.83	....	....	....	....	.82	.80	.82	....	....
32-32.9	....	....	....	....	....	....	.86	....	....	....	....	.84	.83	.85	....	....
33-33.9	....	....	....	....	....	....	.86	....	....	....	....	.86	.85	.87	....	....
34-34.9	....	....	....	....	....	....	.86	....	....	....	....	.88	.87	....	....	....
35-35.9	....	....	....	....	....	....	.86	....	....	....	....	....	.90	....	....	....
36-36.9	....	....	....	....	....	....	....	....	....	....	....	....	.92	....	....	....
37-37.9	....	....	....	....	....	....	....	....	....	....	....	....	.94	....	....	....
38-38.9	....	....	....	....	....	....	....	....	....	....	....	....	.96	....	....	....
39 and over	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Signal Hill—Met on same day by The Texas Company, Union Oil Co. and General Petroleum Co., and Associated Oil Co.

Huntington Beach—The Texas Company, Union Oil Co., General Petroleum Co. and Associated Oil Co. schedules stop at 26-26.9 degrees, 75 cents.

Seal Beach, Alamitos Heights—The Texas Company met all prices; Union Oil Co., General Petroleum Co. and Associated Oil Co. schedules stop at 26-26.9 degrees, 75 cents.

Athens, Rosecrans, Domingues—Union Oil Co. schedule stops at 35-35.9 degrees, posting 32-32.9 degrees, 85 cents; 33-33.9 degrees, 87 cents; 34-34.9 degrees, 89 cents; 35-35.9 degrees, 90 cents. Associated Oil Co. met Standard Oil Co. schedule; General Petroleum Co. met Standard Oil Co. prices, stopping at 32-32.9 degrees at 86 cents.

Torrance—Met by The Texas Company. Met by Associated Oil Co, General Petroleum Co. and Union Oil Co., up to 25-25.9 degrees at 75 cents.

Inglewood—Met by Associated Oil Co. and General Petroleum Co.

Playa Del Rey—(Prices subject to 5 cents per barrel gathering charge. Met by Union Oil Co. schedule starting at 19 gravity.

Olinda-Brea Canyon—Met by Union Oil Co. Met by General Petroleum Co., up to 25-25.9 degrees at 75 cents.

Santa Fe Springs—Met by The Texas Company, General Petroleum Co., Union Oil Co. and Associated Oil Co.; schedules start at 24-24.9 degrees, 64 cents, and end at 35-35.9 degrees, 90 cents.

East Coyote—Effective March 5, Union Oil Co.: 14 to 16.9 degrees, 55 cents; 17-17.9 degrees, 57 cents, with 2 cents added for each degree upward to 24.24.9 degrees, at 71 cents.

Richfield—Met by The Texas Company; met by Union Oil Co. up to 25-25.9 degrees, at 75 cents.

Montebello—Met by Union Oil Co. up to 25-25.9 degrees, at 65 cents.

Kern River, Mount Poso, McKittrick, Sunset, Midway, Elk Hills, Buena Vista Hills—Effective March 5, Union Oil Co.: 11-13.9 degrees, 44 cents; 14 to 19.9 degrees, 49 cents; 20-20.9 degrees, 52 cents; 21-21.9 degrees, 55 cents; 22-22.9 degrees, 57 cents; 23-23.9 degrees, 60 cents; 24-24.9 degrees, 63 cents; 25-25.9 degrees, 66 cents; 26-26.9 degrees, 68 cents; 27-27.9 degrees, 71 cents; 28-28.9 degrees, 74 cents; 29-29.9 degrees, 76 cents; 30-30.9 degrees, 79 cents. Associated Oil Co. scheduled in Midway, Elk Hills and Buena Vista Hills starts at 11 to 13.9 degrees, 44 cents; same as Union Oil Co. schedule from 14 to 29.9 degrees; 30-30.9 degrees, 79 cents. General Petroleum Co.: Effective March 5 in Midway-Sunset same as Associated Oil Co.; Fruitvale, Kern Front, Kern River, Mount Poso and Round Mountain, 49 cents for all grades.

Montebello—Met by Union Oil Co. up to 25-25.9 degrees, at 65 cents; The Texas Company's schedule in Montebello and North Whittier, 14 to 21.9 degrees, 55 cents; 22-22.9 degrees, 57 cents; 23-23.9 degrees, 60 cents; 24-24.9 degrees, 62 cents; 25-25.9 degrees, 65 cents; 26-26.9 degrees, 68 cents.

Santa Paula—Union Oil Co., March 5, 14 to 19.9 degrees, 55 cents; 20-20.9 degrees, 56 cents, with 1 cent added for each degree upward to 25-25.9 degrees, at 61 cents, and then 2 cents added for each degree upward to 30-30.9 degrees, at 71 cents. The Texas Company posts similar schedule in Santa Paula and Shiells Canyon.

Lost Hills-Belridge—Met by Associated Oil Co. and Union Oil Co., with Union Oil Co. paying 44 cents for 11 to 13.9 degrees gravity.

Coalinga—Met by Union Oil Co. and Associated Oil Co. on March 5 and General Petroleum Co. on March 15, but latter company and Associated Oil Co. posted 44 cents for 11 to 13.9 degrees effective March 5.

Ventura Avenue—Associated Oil Co., March 5, 22-22.9 degrees, 58 cents, with 2 cents added for each degree up to and including 30-30.9 degrees at 74 cents. Effective March 15, General Petroleum Corp.

Orcutt—Union Oil Co., effective March 5: From 16 to 19.9 degrees, 49 cents; 20-20.9 degrees, 52 cents; 21-21.9 degrees, 55 cents; 22-22.9 degrees, 57 cents; 23-23.9 degrees, 60 cents; 24-24.9 degrees, 63 cents; 25-25.9 degrees, 66 cents; 26-26.9 degrees, 68 cents.

Kettleman Hills—Effective March 5, Standard Oil Co., Union Oil Co. and Associated Oil Co.: 33 to 33.9 degrees, 66 cents, with 2 cents added for each degree upward to 39-39.9 degrees at 74 cents. Effective March 15, General Petroleum Corp.

Elwood—Prices f.o.b. ship—Standard Oil Co. of California, effective March 5: 33-33.9 degrees, 83 cents; 34-34.9, 85 cents; 35-35.9 degrees, 87 cents; 36-36.9 degrees, 89 cents; 37-37.9 degrees, 91 cents. Met by Union Oil Co.

Newhall, McKittrick and Kern River—Standard Oil Co. of California, 55 cents for all grades, effective March 5.

Wheeler Ridge—Standard Oil Co. of California, effective March 5: 14 to 20.9 degrees, 49 cents; 21-21.9 degrees, 50 cents; 22-22.9 degrees, 53 cents; 23-23.9 degrees, 54 cents; 24-24.9 degrees, 58 cents; 25-25.9 degrees, 58 cents.

Rincon—General Petroleum Corp., effective March 15: 22-22.9 degrees, 54 cents; 2 cents added for each degree upward to 30-30.9, at 76 cents.

Late Fields

KANSAS

Atlantic Oil Producing Co.'s No. 1 Gates, C NW SE Section 27-21-13w, a wildcat well 11 miles from the nearest other production, will be put on the pump. It made 260 bbls. on its initial production test from the Siliceous lime at 3,679-3,704 feet.

Skelly Oil Co.'s No. 2 Miles, C S half S half NE Section 30-27-10w, Kingman County, was rigging up standard tools at 3,325 feet.

Frank Hollow and others' No. 1 SW cor. SE NE Section 36-22-4w, in Reno County, was rigging. This test is expected to start spudding soon.

J. J. Hall and others' No. 1 Miller, NW cor. NE NE Section 13-14-13w, Russell County, is a new producer in the Miller Pool. Oil rose 1,200 feet in the hole in 3 hours from the Oswald lime at 2,898-2,901 feet. The well will be swabbed for a potential test. It is the second producer in the area. The first well, which is north of the new well, was completed in the spring of 1931 in wildcat territory. This pool is 5 miles northeast of the Ochs Pool.

The Texas Company's No. 1 well, in Section 8-22-3w, in the north end of the Hollow Pool, in Harvey County, was estimated at 150 bbls. an hour from the chat at 3,157-3,206 feet. The gas was estimated at 30,000,000 feet a day. It has been pinched to 40 bbls. an hour.

Darby Petroleum Corp.'s No. 1 Brucker, in Section 24-19-1w, a wildcat east of the Ritz-Canton Field, in McPherson County, was dry in the Wilcox sand at 3,452-60 feet and will probably be abandoned.

W. C. McBride's No. 2 Schmidt, NW cor. NE NE Section 30-22-3w, in Hollow Pool, in Harvey County, swabbed 167 bbls. of oil from the Hunton lime at 3,400-27 feet.

OKLAHOMA

Shell Petroleum Corp.'s No. 1 Faulkner, C SE NW, Section 11-15-4w, a wildcat test in Logan County, found the top of the checkerboard lime at 5,418 feet and was drilling deeper at 5,520 feet.

Denver Producing & Refining Co.'s No. 1 Noe, in Section 34-10-10w, a wildcat in Caddo County, was drilling at 8,800 feet. It is the deepest drilling test in Oklahoma at this time.

The taking of potentials on the Simpson sand wells in the Oklahoma City Field that were making water and those offsetting water wells started May 22, under provisions of an order by the Corporation Commission.

Hearing on the rules on the regulations was held early last week. Water wells on artificial lift will take an eight-hour test. Clean offset wells will have the option of taking a four-hour open flow test or accepting a potential based on the average declines of clean wells and water wells.

For the purpose of figuring the average decline, the zone has been divided along the north line of Sections 22, 23 and 24-11-3w. The decline in the north end of the field is expected to be about 50 per cent, while the decline in the south end about 30 per cent. Most of the water wells are in the north end of the field.

Gulf Production Co. of Oklahoma's No. 5 Medders, SW cor. NW SE, Section 22-11-3w, in the Oklahoma City Field, was cleaned out into the pits but was shut in without taking a gauge. The Wilcox sand was found from 6,485-6,593 feet.

Buell and Herndon's No. 1, CEL SE, Section 29-23-9, Osage County, east of Hominy, flowed 60 bbls. an hour from the Siliceous lime at 2,495-2,500 feet. The Hominy sand was found from 2,483-95 feet. It will probably be pinched to the market outlet, as it is classed as a wildcat.

Amerada Petroleum Corp. and others' No. 1 Mitchell, SE cor. NE SW, Section 15-18-3, Payne County wildcat, found the Viola lime at 4,215 feet where the crew will land the 9-inch casing. This test is believed to be favorably located on the structure, and was drilled as the result of a geophysical survey.

Gulf Port Oil Shipments During March Were Much Larger Than in February

HOUSTON, Tex., May 20.—Shipments by water of crude and refined products out of Gulf Coast ports during March totaled 20,575,899.48 bbls., according to figures just made available. Another million barrels are estimated to have been shipped over terminals not reporting. The March shipments represented an increase of 3,614,098.97 bbls. over February shipments. This was a reflection of the heavy movements of East Texas oil to coastal terminals during March, most of which crude was lifted for coastwise trade to refineries and marketers on the Atlantic Seaboard, or for reconsignment for export out of those ports. There was a slight decrease in export movement out of coastal ports. Coastwise movements of refined products also reflected a substantial increase. Shipments for March as compared with February follow:

COASTWISE SHIPMENTS

Company and terminal—	Crude March (bbls.)	Crude February (bbls.)	Refined products March (bbls.)	Refined products February (bbls.)
Atlantic Pipe Line Co., Atreco	1,152,135.48	1,003,562.54	.....	.....
Atlantic Pipe Line Co., Harbor Island	261,097.61	234,821.08	.....	.....
Atlantic Pipe Line Co., Texas City	529,346.39	483,730.32	5,392.42	.....
Gulf Refining Co., Port Arthur	227,928.48	317,347.33	1,866,591.28	1,498,164.47
Humble Oil & Ref. Co., Baytown	171,412.00	211,740.00	1,792,649.70	1,665,884.15
Humble Oil & Ref. Co., Harbor Island	1,712,529.00	1,478,976.09	.....	.....
Humble Oil & Ref. Co., Ingleside	33,146.00	33,333.00	.....	.....
Humble Oil & Ref. Co., Texas City	375,999.00	237,560.00	.....	.....
Magnolia Pet. Co., Beaumont	1,393,564.94	995,823.19	1,745,072.31	1,796,228.55
Pure Oil Co., Smiths Bluff	402,359.00	322,867.00	473,584.00	537,828.00
Shell Pet. Corp., Houston	474,388.37	326,441.05	1,036,854.76	764,129.15
Shell Pet. Corp., Norco	.....	.....	278,186.43	229,440.34
Standard Oil Co. (La.), Baton Rouge	104,808.00	260,048.00	737,315.00	918,911.90
Sun Oil Co., Sabine Pass	1,560,026.31	.....	.....	.....
The Texas Company, Port Arthur	576,228.00	586,774.00	1,638,045.00	1,536,498.00
Total coastwise shipments	8,974,969.58	6,413,003.51	9,573,690.90	8,945,083.66

EXPORTS SHIPMENTS

Atlantic Pipe Line Co., Atreco	71,759.55	.....	.....	.....
Gulf Refining Co., Port Arthur	.....	.....	66,338.00	120,061.25
Humble Oil & Ref. Co., Baytown	.....	.....	579,680.64	515,256.32
Shell Pet. Corp., Houston	.....	.....	91,918.81	74,590.75
Shell Pet. Corp., Norco	.....	.....	.....	21,157.02
Standard Oil Co. (La.), Baton Rouge	.....	20,026.00	387,953.09	283,343.00
The Texas Company, Port Arthur	144,612.00	208,449.00	685,476.00	361,850.00
Total export shipments	216,372.55	228,475.00	1,811,366.45	1,375,258.34
Total shipments	9,191,342.13	6,641,478.51	11,384,557.35	10,320,342.00

GULF COAST WATER SHIPMENTS FOR JANUARY

Company and terminal—	Crude Coastwise (bbls.)	Crude Export (bbls.)	Refined Coastwise (bbls.)	Refined Export (bbls.)	Total (bbls.)
Atlantic P. L. Co., Atreco	1,166,453.21	.....	.....	.....	1,166,453.21
Atlantic P. L. Co., Harb. Isl.	355,768.53	.....	4,366.68	.....	360,135.21
Atlantic P. L. Co., Tex. City	369,864.56	.....	.....	.....	369,864.56
Gulf Ref. Co., Pt. Arthur	272,335.83	.....	2,000,922.11	32,683.11	2,305,941.05
Humble O. & R., Baytown	339,705.00	.....	1,893,337.69	584,627.83	2,817,670.52
Humble O. & R., Harbor Isl.	2,015,568.00	.....	.....	.....	2,015,568.00
Humble O. & R., Ingleside	134,156.00	.....	.....	.....	134,156.00
Humble O. & R., Neches	75,607.00	.....	.....	.....	75,607.00
Humble O. & R., Tex. City	569,443.00	.....	.....	.....	569,443.00
Magnolia Pet. Co., Beaumont	*875,562.87	.....	*1,744,823.26	.....	2,620,386.13
Pure Oil Co., Smith's Bluff	403,211.77	.....	458,281.87	.....	861,493.64
Shell Pet. Corp., Houston†	258,147.61	.....	1,041,118.51	101,454.09	1,400,720.21
Shell Pet. Corp., Norco	.....	.....	410,155.54	.....	410,155.54
Standard Oil Co. (La.), Baton Rouge	229,987.00	.....	909,619.00	397,957.00	1,537,563.00
Sun Oil Co., Sabine Pass	1,290,683.17	.....	.....	.....	1,290,683.17
The Texas Co., Pt. Arthur	645,012.00	240,450.00	1,761,937.00	373,344.00	3,020,743.00
Total January	9,004,505.55	240,450.00	10,224,561.66	1,496,066.03	20,965,583.24
Total December	9,406,792.44	120,530.00	10,713,523.33	1,403,272.23	21,644,117.99
Difference	402,286.89	119,920.00	488,961.67	92,793.81	678,534.75

*Coastwise and export shipments combined.
†8,053.92 tons of coke shipped export from Shell terminal at Houston.

Exposition at Houston Shows Latest Equipment

HOUSTON, Tex., May 22.—The latest developments in equipment and specialties for the oil industry were on display at the Oil Equipment and Engineering Exposition being held in Convention Hall at Houston this week. The exposition, which opened Monday with approximately 140 different exhibitors, will continue through May 28.

Every phase of the equipment industry is well represented, and included in the displays are demonstrations of production practices which have been only lately perfected but not yet in actual commercial use. In most displays working models in actual operation are shown. The exposition in reality is a school in drilling and production methods.

Technical exhibits of the petroleum engineering departments of several universities, including Rice Institute, of Houston, University of Texas, Austin, and Texas Agricultural & Mechanical College, Bryan, occupied conspicuous booths. These schools have devoted considerable attention to petroleum engineering and have done much research work in connection with training of engineers for the oil industry.

The show was officially opened Monday noon with an address of welcome by James A. House, representative of the mayor of Houston.

ERECTING LARGEST SIGN

The largest electrical spectacular sign in the Middle West is being erected by Standard Oil at the north end of Grant Park in Chicago. Overall dimensions of 200 by 136 feet give the sign a height equal to that of a fourteen story building and a length of half an ordinary city block.

The torch which is a dominant feature is 136 feet high. Words are made up of letters 16 and 18 feet high, with a total weight of eighty tons. The supporting structure weighs 120 tons, giving the entire sign a weight of 200 tons. Directly in view from the Century of Progress grounds as well as from all of downtown Michigan avenue and the outer drives, the sign will flash its message at the millions who visit Chicago's world fair this summer.

BRAZORIA COUNTY TEST

HOUSTON, Tex., May 23.—Amerada Petroleum Corp. and Ryeade Oil Corp.'s No. 3 Seaburn, East Stratton Ridge, Brazoria County, has definitely proved that dome as an important producer in sand topped at 4,405 feet. The well came in flowing initially at the rate of 96 bbls. per hour through a three-quarters inch choke. Cut to a half-inch choke it made 58 bbls. per hour. It now is on a five-sixteenth inch choke showing a pressure of 290 pounds. Gravity is 28.7 degrees corrected.

Prospects of Improvement Hoped by H. F. Sinclair

At the annual meeting of Consolidated Oil Corp., H. F. Sinclair, chairman of the executive committee, read a statement declaring that there is hope and prospects of improvement in the oil industry. He referred to proposed Federal action which he said would be beneficial.

Elisha Walker withdrew at his own request as a director.

In reply to a question, Mr. Sinclair said well pressures are falling very rapidly in the East Texas oil field, which will cause wells to go under pump within several months. He also added that the same condition is true at Oklahoma City.

"While conditions in the oil business have not changed for the better since our annual report was issued covering operations for 1032," Mr. Sinclair said, "there seems to be a hope for improvement. Crude and refined prices have actually been reduced from the low levels prevailing at the beginning of the year, and production at the present time, so far from being under control, is at exceptionally high levels, crude production averaging about 2,750,000 bbls. a day last week.

"However, there is hope of bringing about better conditions as a result of constructive efforts now being made at Washington. What will be the outcome of these efforts is, of course, by no means certain. Whether these efforts will be expressed in the form of special legislation affecting the oil industry, or whether we shall come under a general industries bill, is still an open question. We feel, however, that there is a prospect of improvement for our own and all industries in the frankly announced policy of the administration that if times are to improve, and unemployment reduced, industry must be allowed to so order its policy that profits can be earned.

"While personally I share the general aversion of business men to government control, I am willing to surrender my feelings at a time like this and to join in any effort which promises to hasten the end of the deplorable conditions that have existed in the past few years.

"This, I believe, is the attitude of mind in which most business men are facing the proposals that involve a large measure of government intervention. These measures are, at least, the most hopeful element in the immediate prospect."

REMOVE IMPORT EXEMPTION

NEW YORK, May 20.—American oil importers have been advised that the British government has removed the exemption from import taxes formerly granted kerosene, gas oil, lubricating oil and fuel oil, and that henceforth an import tariff will be imposed upon these oils. The import duty on these oils will be 1d. per gallon, as compared with the present duty of 8d. per gallon on the heavy oils, and all stocks of these oils now held by oil companies and consumers in England, exceeding 10,000 gallons, will pay an excise duty of 1d. per gallon upon their stocks.

Oil for storage or bunkers on foreign-going ships will be exempt from this duty, which is expected to yield the British treasury £2,300,000 a year.

MAGNETIC STORM

Tucson, Ariz., observatory of the United States Coast and Geodetic Survey report a moderate magnetic storm started at 7 p.m. (C.S.T.) on May 18 and ended at 8 a.m. (C.S.T.) on May 19. Their telegrams follow:

"Storm began eighteenth. One. Moderate."

"Storm ended nineteenth. Fourteen."

TIDE WATER-CONOCO RUMOR

NEW YORK, May 23.—Reports in financial circles indicating negotiations for merger of Tide Water Associated Oil Co. and Continental Oil Co. could not be confirmed at the offices of these companies here today.

NEWS FOR PETROLEUM REFINERS

Greater Activity Among Refiners in North Texas Area

FORT WORTH, Tex., May 20.—The Paragon Refining Co., owned by Freeman and Hampton of Wichita Falls, is now testing its 500-bbl. skimming plant at Leuders, Tex., and will soon start processing crude from its leases in Shackelford County. It has 250 bbls. daily production of its own and will probably purchase other oil in this area to run through its plant.

The Marathon Oil Co. is now testing the new cracking unit and other equipment installed by the M. W. Kellogg Co. at its local refinery. Output of refined products will be increased because of the new additions to the plant. The Marathon company is a subsidiary of the Mid-Kansas Oil & Gas Co.

The Waggoner Refining Co. has again started running its 3,500-bbl. plant near Electa in Wilbarger County, which was shut down for a short time because of conditions in the industry. It is now processing 2,000 bbls. per day.

The LaSalle Petroleum Corp., with a 3,500-bbl. refinery at Burkburnett, the Panhandle Refining Co. at Wichita Falls and the Olney Refining Co. at Olney in Young County, are three of the first refining companies to pay premiums for oil in this district. The former is paying 10 cents above the posted price, retroative to 7 a.m. May 6. The latter is paying 37½ cents per barrel for crude, or a premium of 12½ cents. Some of the plants in this district have been processing considerable crude oil from East Texas but with purchasers taking all they can get from that district shipments to outside refineries have been curtailed. Shutting in of many properties in the Ranger and Wichita Falls districts has taken considerable crude off the market in these two areas and added to the difficulties of refineries around Wichita Falls. One company shut in 139 wells in the district.

Southern Oil Corp. has formed a refinery unit which is known as the Southex Refining Co. This company has purchased the Tren-Tex Refining Co. plant at Trent near the Noodle Creek Pool in Jones County from which place it derives crude for processing. The plant has a daily crude capacity of 250 bbls., but will be increased by the new owners to 500 bbls. per day. A 6-mile 2-inch line connects the plant with the pool.

Plant at Jacksboro

Jacksboro Refining Co. at Jacksboro, Texas, is now testing its 250 barrel skimming plant which will commence operations immediately, processing crude from the nearby producing areas of Jack County.

W. E. Johnson and associates have started construction on a 200 barrel skimming plant which will be located 2 miles south of Wichita Falls on the Fort Worth highway. Refined products will be sold locally.

Instead of low prices tending to keep down and eliminate the small refiner and marketer proof is to the contrary in the building of many plants during the past year and a half. Nearly all of these small plants are operating, and operating in many instances on crude from wells to which no major purchaser has connected, and from which the oil has to be hauled by trucks to the plants. Small plants have sprung up all over the state, but principally in East Texas, North and North Central Texas.

Tide Water Starts Sale of New Gasoline Containing Top Cylinder Lubricant

NEW YORK, May 22.—Tide Water Oil Co. this week introduced in eastern markets its new "Triple X" gasoline, featuring high antiknock rating and upper cylinder lubrication. At the close of the month the new gasoline is expected to have ethyl compound added to it, making a motor fuel with triple premium features to be sold at regular prices.

Announcing its new product, the company says in part: "Tydol announces a new type gasoline—a gasoline that lubricates as it drives. In every gallon of the new Triple X Tydol there has been blended the scientifically correct proportion of a water white, carbonless lubricant, refined by Tide Water's secret K.A.E. process. This lubricant insures perfect top cylinder and valve lubrication, acts as a carbon solvent and actually results in a definite increase in gasoline mileage.

"The benefits of this lubricant have been proved on the road in tests of more than 11,000,000 miles."

The Tide Water action is expected to be a forerunner of active competition among the larger distributors in emphasizing the new properties of their motor fuels. Starting the end of the week, Standard Oil Co. of New Jersey will introduce its new regular grade product, "Essoline." The same product will be introduced by all marketing subsidiaries of the New Jersey company, which includes Standard of Pennsylvania, Standard of Louisiana and Colonial-Beacon Oil Co. The new gasoline will contain tetraethyl lead under the new license agreement of the Ethyl Gasoline Corp., which permits the ethylizing of a "Q" or second grade Ethyl Gasoline. Although not formally announced it is understood that this gasoline will also contain a top cylinder lubricant.

Large N.P.A. Group Visits Refinery at Philadelphia

PHILADELPHIA, Pa., May 20.—A large number of chemists, engineers and plant managers today visited the refinery of the Atlantic Refining Co. located at Point Breeze. The visit was arranged under the auspices of the department of standards and tests of the National Petroleum Association and representatives of the association's membership were invited to attend.

Special attention was given to the laboratories of the Atlantic plant, one of the most complete in the refining industry. Many of the newer methods of testing were explained at the laboratories. The following program was presented in the evening:

"The Antiknock Testing of Gasoline," by H. F. Huf.

"Function and Evaluation of E. P. Gear Lubricants," by A. P. Frame.

"Viscosity Measurement," by Dr. H. V. Hume.

"The Supervision of an Inspection Department," by H. M. Hancock.

The meeting was in charge of Willis Crane, associate counsel of the association. Arrangements were made for those interested to visit the chemical and engineering laboratories of the University of Pennsylvania.

TO START LAUREL REFINERY

The refinery at Laurel, Mont., now owned by Independent Oil & Refining Co. is being reconditioned and operations are expected to start early in June. The plant will be operated with crude oil obtained from fields in southern Montana and northern Wyoming.

The Laurel refinery was built several years ago and was operated a short time. The plant has a crude oil capacity of 5,000 bbls. daily with cracking facilities.

LARGE FUEL OIL ORDERS

Several California refiners are to participate in the fuel oil business for the West Coast of the United States Navy starting July 1 and ending one year later. The business totals 4,500,000 bbls. and is divided as follows: Hancock Oil Co., 1,000,000 bbls.; Associated Oil Co., 1,000,000 bbls.; Sunset Pacific Oil Co., 850,000 bbls.; Union Oil Co., 600,000 bbls.; The Texas Company, 600,000 bbls., and Rio Grande Oil Co., 500,000 bbls.

Refuses Permit to Unload Shipments of Tractor Fuel

The Oil Inspection Division of the State of Minnesota has instructed deputy oil inspectors not to give permission to unload a product being shipped into the State as "tractor fuel." In its orders to the inspectors the Oil Inspection Division said:

"This product cannot be classified according to our specifications as it has about the following test: Gravity, 40° to 46°; initial boiling point, 160° to 200°; endpoint, 450° to 550°; open cup flash of 75° to 95°, and ranges in color from straw to red.

"We understand that it is sometimes billed as naphtha or distillate. This department refuses to allow this product to be unloaded on account of both tax evasion and safety measures. It could be readily burned in any truck or automobile in hot weather. If they attempt to bring it in as a fuel called distillate or naphtha, the flash is so low it is dangerous. We ask that you be on the lookout for any inshipments of this product, and to be sure to refuse the unloading of same."

NEW OPERATIONS IN EAST TEXAS

L. V. Lee is building a 150-bbl. skimming plant at Gilmer in northern Gregg County in East Texas, and E. B. Williams is building a similar sized plant 4 miles north of Gladewater on the Gilmer highway.

Big Sandy Refining Co. has started work on a small refinery at Big Sandy, west of Gladewater in Smith County. A 4-inch line connects the field with a loading rack at Big Sandy, and this line is expected to transport oil to the refinery when completed.

Travis and Crow are building a small refinery on the L&G.N. Railroad north of Kilgore in Gregg County.

McGehee and Porter are building one 55,000-bbl. tank and have plans to erect four more on the George Culver farm northeast of Kilgore where they have started construction of a skimming plant.

PLANT AT ROUNDUP, MONT.

The River Dome Oil Co. is building a small topping plant at Roundup, Mont. A filling station has been built on the refinery site. The plant will be operated with crude oil from the Cat Creek Field.

Start Construction of Lubricating Oil Refinery at Bolivar

Work was started last week on the construction of a lubricating oil refinery at Bolivar, N. Y., to be owned and operated by the Allegany Refiners, Inc. The project has been under consideration for some time. The $500,000 capital stock of the company is largely held by producers in that territory. The plant will have a capacity of 750 bbls. daily and will operate with Pennsylvania dark crude oil produced in Bolivar, Richburg, Obi, Salt Rising, Little Rock City, Genesee and Horse Run areas. Fifty-five miles of gathering lines in these areas have been purchased from the Bradford Transit Co., to collect and deliver to the refinery at Bolivar.

The site of the refinery is on a 25-acre tract on the Baker farm, 1½ miles southeast of Bolivar. The site adjoins the Pittsburgh, Shawmut & Northern Railroad. The entire plant will be completed in nine months while one unit for the manufacture of light oil products will be completed by October 1.

Officers of the company are: A. L. Shaner, president; J. M. Karl, vice president; D. V. McCarthy, vice president; Neil S. Sullivan, secretary and treasurer. The directors are: M. C. Bascom, J. C. Bradley, C. A. Chipman, R. J. Dermitt, Forrest D. Dorn, J. M. Karl, J. W. Mathews, D. V. McCarthy, J. A. Messer, R. B. Moore, A. L. Shaner, W. E. Sawyer and F. J. Wilson.

Contract for the construction of the plant has been let to the Leader Industries, Inc. The plant equipment will include: One shell still unit, two pipe still units, one boiler house with two 250 horsepower boilers capable of operation at 200 per cent of rating, one Turbo generator set to develop electric power and lighting, power house, filter house, burner house, wax and centrifuge plant, sweating house, agitator, barrel and stock house, office and laboratory, machine shop, loading racks and pump houses.

About 80 tanks will be included in the refinery construction job. They will range from about 300 bbls. to about 5,000 bbls. capacity. The tankage will be made up of rundown tanks for the various units, crude storage and products storage tanks.

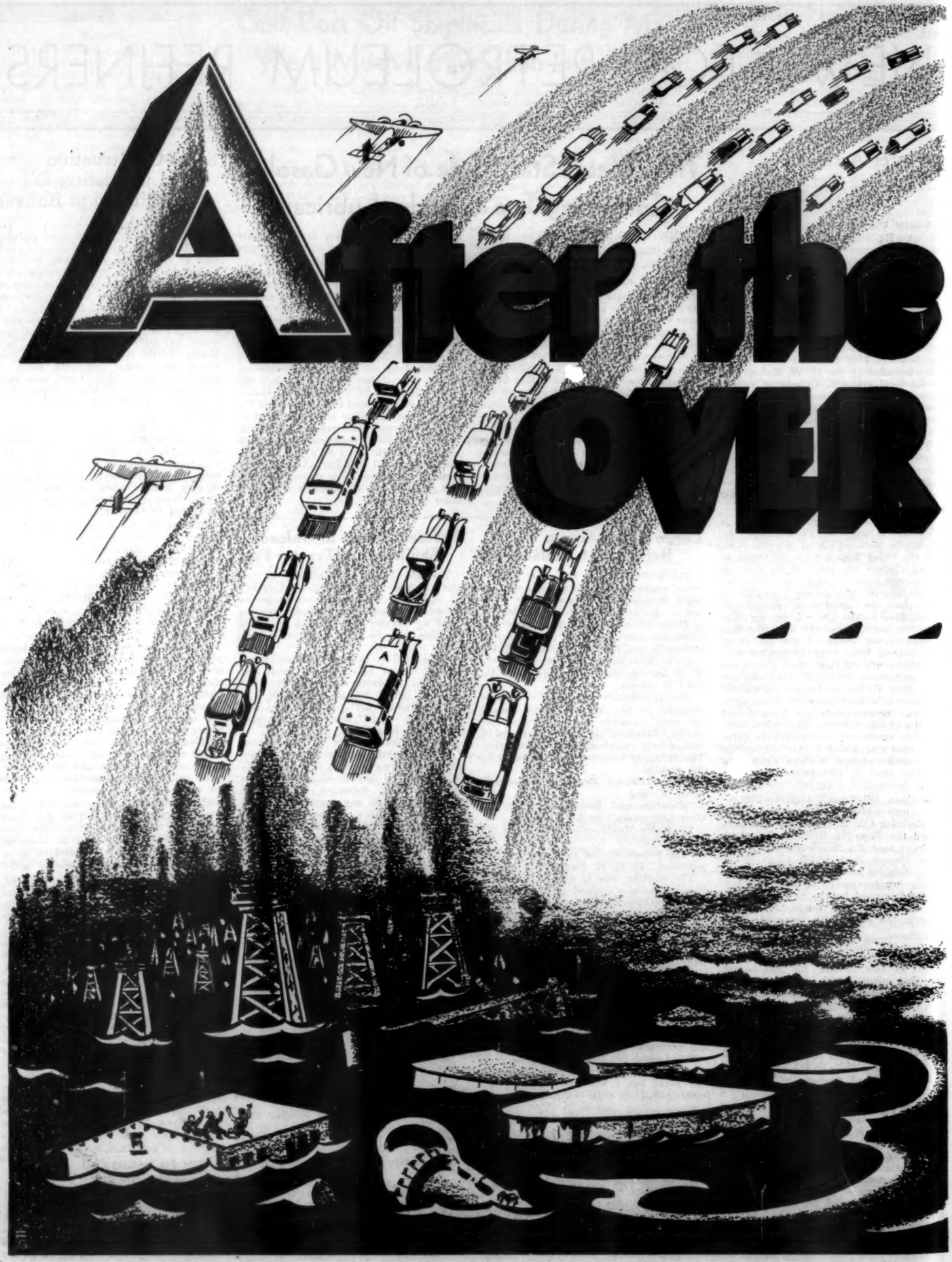
The plant will make gasoline, naphtha, kerosene, 36-40 fuel oil, nonviscous neutrals, viscous neutrals, bright stocks, finished motor oils, slack wax and petrolatum.

ALLEGE PATENT INFRINGEMENTS

Suit alleging infringement of cracking patents has been brought by The Texas Company against Star Refining & Producing Company. In this suit, The Texas Company alleges infringement of the patent to Behimer No. 1,840,012, for Apparatus for Making Gasoline, and patent to Behimer No. 1,883,850, for Process for Making Gasoline. The operations complained of are the cracking operations conducted by the defendant at its plant at Fort Worth, Texas. The suit was filed in the United States District Court for the Northern District of Texas, at Fort Worth.

SOUTH DAKOTA RE

Located in a territory fineries are operating, t finery, Inc., is skimmir 100 bbls. of oil daily Rapid City, S. Dak. G dent, J. R. Johnson E. R. Hurst secreta


After the
OVER

Deluge of PRODUCTION

Comes the Rainbow!

Too much oil! But NOW a way to dispose of it, profitably!

The Oil Industry must persuade North America to MOTOR to the World's Fair!

Between now and November 15,000,000 people will journey to Chicago. Some will go 300 miles—some 2,000 miles. While they are IN Chicago, if they have their cars, they will each drive several hundred miles. Then they must return home.

These people thus represent a market, during the next 5 months, for hundreds of millions of extra gallons of gasoline, and for millions of quarts of motor oil,—IF they can be persuaded to make the trip BY MOTOR!

Let the Oil Industry but put the weight of its influence and its advertising behind this great idea—and the next 5 months will be THE BANNER PERIOD OF OIL CONSUMPTION OF ALL TIME!

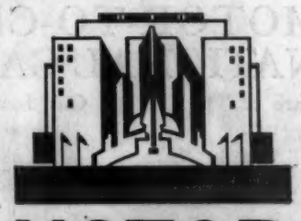
A strong sentiment in favor of concerted action in this matter already exists in the Industry. The Oil and Gas Journal is attempting to crystallize this sentiment and induce immediate action.

YOU, Mr. Oil Man, can see that YOUR company joins in this campaign. There is no formality in joining this movement. Just become ACTIVE, immediately, in spreading the suggestion, "MOTOR to the World's Fair."

We have devoted the next two pages to practical suggestions as to how this can be done. Review them. The materials can be ordered from your usual sources or, perhaps at a price advantage, from those who have already quoted us based on the supposition of a large volume on each item.

If every Producer, Refiner, Jobber, and Equipment Manufacturer will ACT on this matter, a STUPENDOUS national effect will be produced. Benefits will be enormous. The basic condition of the Industry will be improved.

Many leaders are acting now. Throw in YOUR weight, too. Act TODAY.



MOTOR

TO THE WORLD'S FAIR

MOTOR-TO-CHICAGO NATIONAL CAMPAIGN

Care of The Oil and Gas Journal, Tulsa, Oklahoma.

Oil Men! Seize This Golden Opportunity

"MOTOR TO THE

Here's How It Can Be Done!

The combined Oil Industry—refiners, jobbers, producers, equipment manufacturers—are spending many millions of dollars, each year, for advertising. Large refiners are running tremendous national campaigns. Jobbers and station owners in every city of moderate size are running effective local and sectional campaigns.

If all of this tremendous volume of advertising should begin to carry the slogan, "MOTOR to the World's Fair!"—if every filling station in the nation should begin to flaunt banners and to distribute windshield stickers bearing it—the combined effect would be STUPENDOUS. Not a motorist in North America but would catch the spirit of the huge drive and be stimulated by the attractive thought suggested.

The response would be tremendous.

Specifically, here are the things that can be done, starting at once:

1. Articles in the Newspapers

Furnish news articles to the daily and weekly newspapers with which you are in contact. Furnish them small mats of the emblem shown below, to use as illustrations.

In the next issue of The Oil and Gas Journal we will reprint some actual news articles suitable for furnishing to your local papers. Our staff has been compiling material for this purpose, of genuine news interest, for the purpose of furnishing such service to the Industry without charge of any kind. This material is available to you right now. Send for it.

2. Slogan Cuts in Advertising

Obtain cuts of the slogan emblem and insert them in your display advertising in newspapers, magazines, house organs, etc. The Oil and Gas Journal will be glad to furnish mats or electros of this emblem, in black or two colors, in any of the four sizes shown on this page, strictly at cost, postage prepaid. Payment should be sent with order, to avoid bookkeeping. Cost will be: Mats, any size shown, black only—20 cents each. Electros, black only, No. 1, 81 cents; No. 2, 85 cents; No. 3, 97 cents; No. 4, $1.10. Two-color cuts, double the cost of black only.

3. Slogan Cut on Envelopes and Letterheads

This campaign will last for five months. Why not have an ample supply of your letterheads and envelopes, for this period, imprinted by your local printer with this emblem, preferably in two colors? The cost will be little, and the advertising value will be great. Envelopes, particularly, are handled by eight or ten people in addition to the recipient of the letter. Here is a great free circulation of which advantage can be taken.

Cuts can be obtained as outlined in the foregoing section.

4. Announcements Over the Radio

Work this slogan into your regular radio announcements. If possible, use this idea as material, during the next five months, for some of your entire announcements. It offers splendid copy possibilities, and should be as effective as other material in promoting the use of gasoline and motor oil.

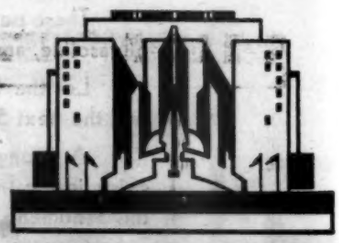
Subsequent announcements in The Oil and Gas Journal will offer suggestions for the texts of radio announcements. But if you desire such material immediately, write us and we will be glad to forward suggestions which our staff has been compiling, without charge of any kind.

5. Distribute Windshield Stickers

Furnish to your filling stations and to your distributors, windshield stickers featuring the emblem shown below. If this suggestion is widely acted upon, and filling stations throughout the nation are furnished with supplies of such stickers, a constant display of this colorful emblem will result on several million windshields.

To indicate approximate cost of such stickers, The Oil and Gas Journal has obtained quotations from a leading manufacturer on a good quality sticker. The prices quoted, in quantities ranging from 50,000 to 2,000,000, vary from $1.37 down to 73 cents per thousand. These prices are based on the supposition of a large volume on this item. If the foregoing quotations offer a price advantage over quotations obtained from your usual sources, The Oil and Gas Journal will be glad to receive and forward your order, purely as an accommodation. The manufacturer will then deal directly with you.

The same sticker, but produced as a genuine waterproof decalcomania, can be had, in quantities from



MOTOR-TO-CHICAGO NATIONAL CAMPAIGN

Care of The Oil and Gas Journal, Tulsa, Okla.

Get Into Action Now . . . . Promote the Idea

WORLD'S FAIR!"

5,000 to 100,000, at prices ranging from $11.40 down to $6.39 per thousand.

6. Signs at Your Filling Stations

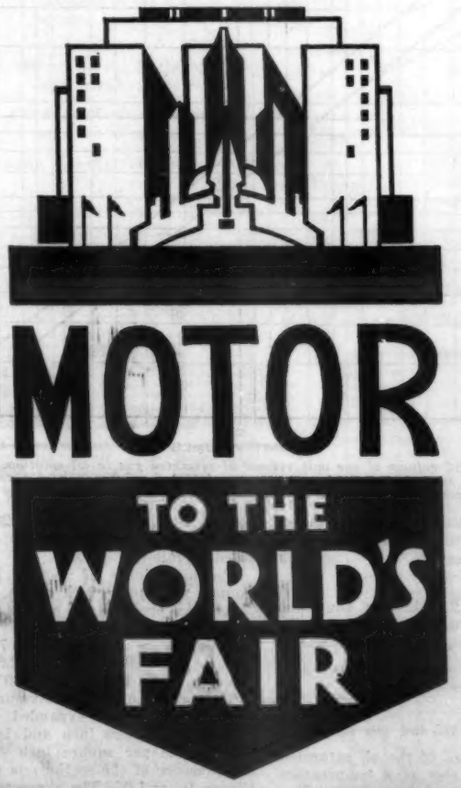
Colorful filling station signs and banners displaying this emblem can go far towards attracting national attention to this idea. Such signs and banners, flaunted at *every* filling station, would register a tremendous impress on the national consciousness.

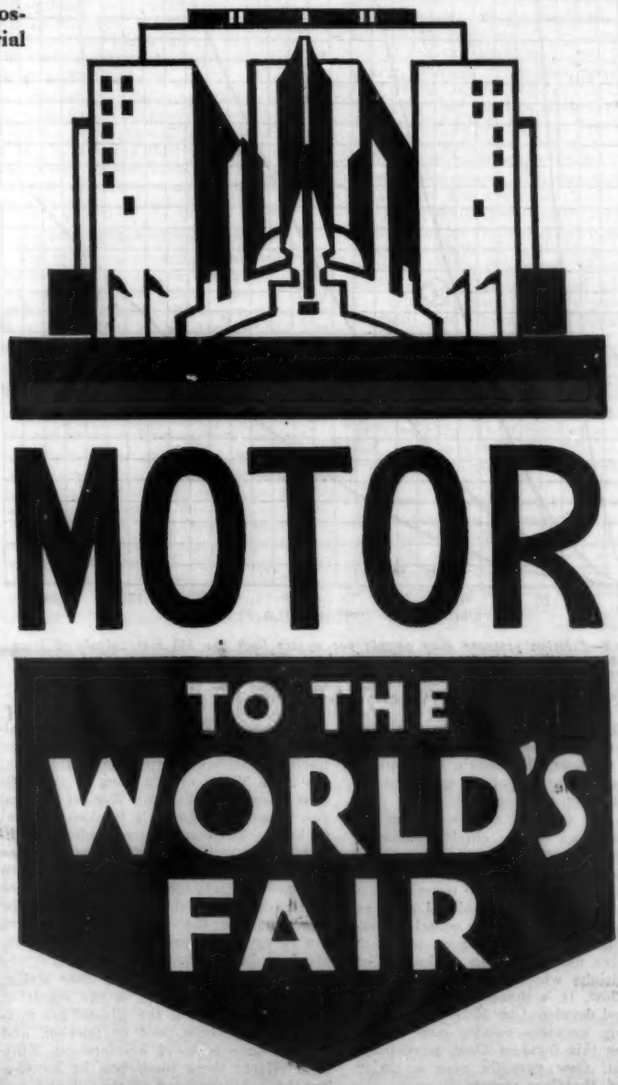
Here, again, The Oil and Gas Journal has obtained informative quotations from a leading manufacturer, to indicate approximate cost. It is learned that this design can be obtained in two colors printed on paper sheets about 14 inches wide by 24 inches deep, for mounting inside filling station windows or in other sheltered locations, in quantities from 5,000 to 100,000, at prices ranging from $15.90 down to $9.65 per thousand.

If the design is desired on heavy engraved muslin banner, approximately 21 inches wide by 36 inches deep, prices in quantities from 1,000 to 10,000 range from $228.00 to $136.00 per thousand.

The Oil and Gas Journal has no interest in these quotations other than to furnish information and facilitate quick action. If the prices quoted to us are found advantageous, we will be glad to have you place your order through our office, after which the manufacturer will handle the matter directly with you. The quotations given are from leading manufacturers of quality merchandise.

The Oil and Gas Journal is interested in promoting this national movement in every possible way. Our editorial staff has been preparing suitable publicity material for the press and for radio use, as a service which we are glad to render to the Oil Industry entirely without charge. Call on us for this material and for any other service we can render. Watch our columns every week for additional suggestions in connection with this national drive.





Study and Application of Subsurface Pressures

(Continued from Page 16)

lost by slippage, the "slippage factor" is subtracted from 1.

Mist Flow

The second form of flow, mist flow, apparently prevails where the volume ratio of gas to oil in the flow string is greater than 1. Under these conditions the foam tends to break up, and gas becomes the outside phase. The relative linear velocity when gas is the outside phase is much greater than where oil is the outside phase.

Versluys cites the results from some experiments which showed that the relative linear velocity of gas through oil as the outside phase was from two-thirds to 1 foot per second while the relative linear velocity necessary to sustain oil droplets in gas as the outside phase was approximately 33 feet per second.

When this form of flow condition exists, where gas is the outside phase, a much greater loss of the total available energy occurs as a result of slippage. The "slippage factor" curve covering this form of flow can be considered only as an approximation of the actual conditions as the present data were too limited to give more than an indication of the conditions which prevail under this type of flow. It is thought that by using the method developed by Moore and Schilthuis more accurate results may be obtained for this form of flow, particularly if mist flow prevails over a major portion of the flow string.

In either the foam or mist flow there is a minimum velocity requirement; otherwise slippage consumes a sufficient quantity of the available energy to preclude the flow of oil. For East Texas conditions the limiting minimum velocity for foam flow was found to be in the neighborhood of 0.3 foot per second.

Foam flow is more efficient than the mist form of flow. However, the present tests indicate that it can exist only where the volume ratio of gas to oil in the section is less than 1; therefore, the pressure head of foam flow is much greater than in the mist form of flow, which exists at any volume ratio of gas to oil greater than 1. It is possible, to obtain much lower flowing pressures with the mist form of flow, although this can be obtained only at the expense of the efficient utilization of the gas energy.

Pressure Drop

A method of calculating the pressure drop for the foam flow condition has been developed by using the "slippage factors" which were determined from the East Texas tests, and the pressure volume curves obtained by Lindsly from the flash liberation of bottom hole samples of the East Texas oil. In view of the definite knowledge that the flow of oil and gas is not isothermal, it is also essential to know the temperature gradient within the flow string. If the pressure-volume curves from flash liberation are unknown the use of reliable solubility data for similar gas and oil can be used. In the same manner the temperature gradient can be estimated providing the sand temperature is known.

The pressure drop in the flow string, as discussed previously, is the result of the pressure head of the oil and gas mixture, the pressure head of friction, and the pressure head of acceleration. Slippage affects these conditions by increasing the pressure head of the oil and gas mixture. For practical purposes, under most conditions of flow the pressure drop in the flow string can be considered to be the sum of the pressure head of the oil and gas mixture and the friction head. Under conditions where a great change of linear velocity occurs in the flow string, acceleration should be taken into consideration.

The method developed for calculating the pressure drop for the foam condition of flow consists of dividing the flow string into sections, assuming a definite pressure drop and calculating the length of each section by determining the weight of the column of oil and gas, and the friction drop. In cases where no gas is liberated from solution as a result of the pressure being greater than that required to hold the gas in solution, Fanning's equation is used to evaluate the pressure drop due to friction, or read directly from the curves in Figure 8. For conditions where gas and oil are both flowing through the section, the equation developed by Moore and Schilthuis for calculating the pressure drop due to friction is recommended.

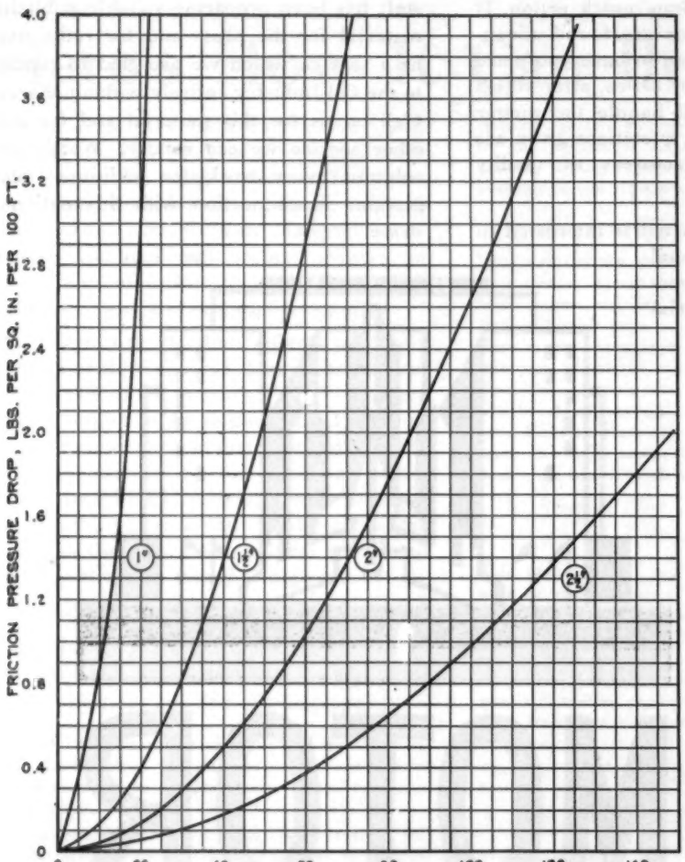


Figure 8—Friction pressure drop pounds per square inch per 100 feet calculated from Fanning's equation. Absolute viscosity of oil = .00056 foot-pounds-seconds. Linear velocity in feet per second for 2½-inch tubing = barrels per hour × .04803; 2-inch tubing = barrels per hour × .07194; 1¼-inch tubing = barrels per hour × .11017; 1-inch tubing = barrels per hour × .4603

Example Cited

In order to illustrate the method and to simplify the explanation the following example has been worked out:

Length of flow string 3,565 feet.

Size of flow string 2½-inch.

Rate of production 6.01 bbls. per hour.

Gas volume, only gas dissolved in the oil.

Temperature at 3,565 feet, 150° F.

Pressure at 3,565 feet, 1,155 pounds per square inch.

Pressure at which gas starts to liberate from solution in the oil, 740 pounds per square inch gauge.

1. Calculate the rate of oil production at the bottom of the tubing since the oil shrinks in volume due to the liberation of gas from solution. Figure 4 shows the shrinkage of the oil volume due to the liberation of gas.

$$\frac{6.01}{83.} \times 100 = 7.2 \text{ bbls. per hour, the volume of oil entering the bottom of the flow string.}$$

The pressure drop which will occur in the flow string before liberation of gas occurs:

$$1{,}155 - 740 = 415 \text{ lbs. per sq. in.}$$

The pressure head of the oil saturated with gas per 100 feet at a temperature of 150° F. is obtained from Figure 5.

$$\frac{415}{32.53} \times 100 = 1{,}276 \text{ feet or the height the oil would be lifted if the oil was not cooled by radiation of heat to the surrounding formations.}$$

Using this approximate length of section, the temperature at this point can be determined from Figure 7 for a flow of 7.2 bbls. per hour, $3{,}565 - 1{,}276 = 2{,}289$ feet. Temperature at this point is 130° F.

$$\frac{130 + 150}{2} = 140° \text{ F. or the average temperature of the section.}$$

The pressure head of oil saturated with gas for a temperature of 140° is obtained from Figure 5 and is 32.83 pounds per square inch per 100 feet.

$$\frac{415}{32.83} \times 100 = 1{,}264 \text{ feet, the height the oil would be lifted if no friction occurred.}$$

Since only oil is flowing through this section, Fanning's equation can be used, or for East Texas oil it may be determined from Figure 8. For a rate of flow of 7.2 bbls. per hour the pressure drop due to friction is 0.011 pound per square inch per 100 feet.

$$\frac{1.264}{100} \times 0.011 = 0.14 \text{ lb. per sq. in. friction drop for section (in this case negligible).}$$

$$\frac{415 - .14}{32.83} \times 100 = 1{,}264 \text{ ft., or the height the oil is lifted before the pressure reaches 740 lbs. per sq. in. gauge.}$$

2. Below a pressure of 740 pounds per square inch gauge, sections of 200 pounds per square inch pressure drop are calculated as follows:

Pressure limits of section 740—540 pounds per square inch gauge.

Average pressure 640 pounds per square inch gauge.

Temperature at point where 740 pounds occurs, $3{,}565' - 1{,}264' = 2{,}301'$, read from curve in Figure 7 is 130° F.

The volume of one unit volume of saturated oil solution expanded from 740 pounds per square inch and 146° F. to 640 pounds per square inch (the average pressure of the section) is read from Figure 9, = 1.07. The corrected volume of one unit volume of oil when gas is liberated from a pressure of 740 pounds per square inch gauge to a pressure of 640 pounds per square inch gauge from Figure 4 is 0.994.

$1.07 - 0.994 = 0.076$ unit volume of at 640 pounds per square inch gauge and

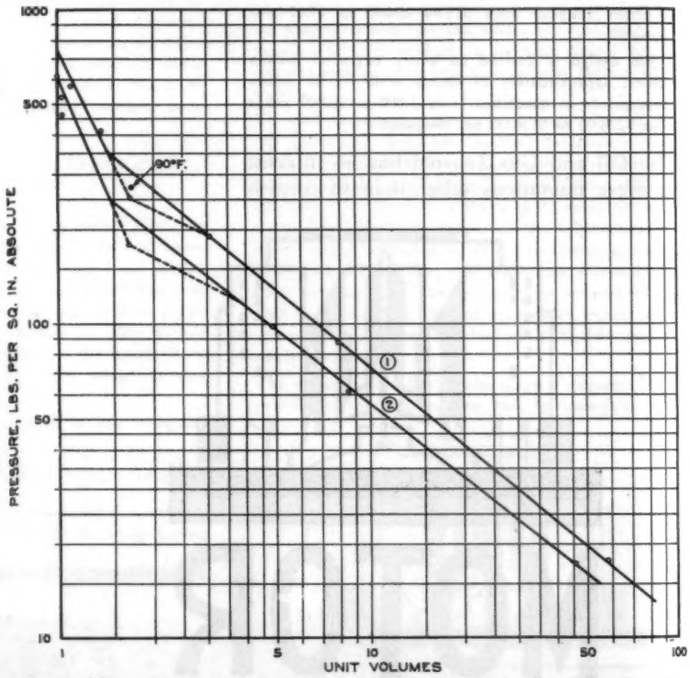


Figure 9—Expanded volume of one unit volume of saturated gas in oil solution. Curve 1, at 755 pounds per square inch absolute pressure and 146° F. Curve 2, at 618 pounds per square inch absolute pressure and 90° F. From data by B. E. Lindsly

146° F. Correcting this volume to the entrance temperature of the section, 130° F.

$0.076 \times \frac{590}{606} = 0.074$ unit volumes of gas.

$0.074 + 0.994 = 1.068$, approximate volume of one unit volume when expanded to 640 lbs. per sq. in. gauge and 130° F.

The pressure head of the oil-gas solution at 146° F. and 740 pounds per square inch gauge, the conditions upon which

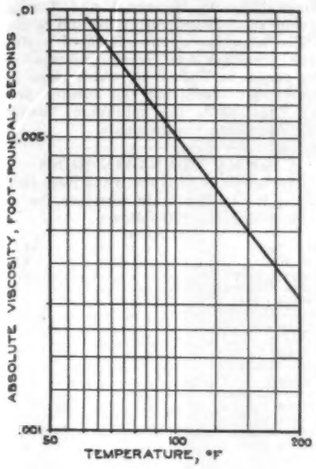


Figure 10—Effect of temperature on viscosity of East Texas crude. Note: To convert to absolute viscosity in centipoises multiply by 1,488.2

the pressure-volume curve in Figure 9 is based, from Figure 5 is 32.65 pounds per square inch per 100 feet.

$\frac{32.65}{1.068} = 30.57$ lbs. per sq. in. per 100 ft., the approximate pressure head of the foam in the section.

$\frac{200}{30.57} \times 100 = 654$ ft., or the approximate length of the section.

$2,310 - 654 = 1,656$ ft., the approximate top of section.

Temperature at 1,656 feet flowing 6.01

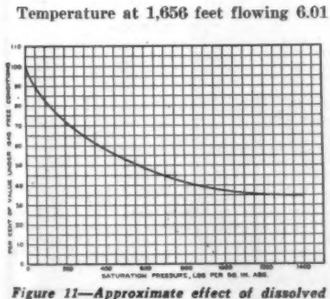


Figure 11—Approximate effect of dissolved gas on velocity of oil. After Moore and Schilthuis

bbls. per hour from curve in Figure 7 = 114° F.

$\frac{130 + 114}{2} = 122°$ F., the average temperature of section.

Correcting gas volume to average temperature:

$0.076 \times \frac{582}{606} = 0.073$, gas liberated at 122° F. and 640 lbs. per sq. in. gauge from unit volume of oil-gas solution at 146° F. and 740 lbs. per sq. in. gauge.

$0.073 + 0.994 = 1.067$, volume of oil and gas at 122° F. and 640 lbs. per sq. in. gauge, produced by the expansion of 1 unit volume at 146° F. and 740 lbs. per sq. in. gauge.

Approximate average velocity—Area of 2½-in. tubing = 0.0325 sq. ft.

$\frac{7.2 \times 5.62 \times 1.067}{60 \times 60 \times .0325} = 0.370$ ft. per sec.

Per cent gas in foam in section $\frac{.073}{1.067} \times 100 = 6.8$ per cent.

Slippage factor from Figure 3 = 0.01.

$0.01 \times 0.073 = 0.00073$ effective volume of gas as a result of slippage.

$0.00073 + 0.994 = 0.995$, volume of oil and gas at 122° F. and 640 lbs. per sq. in. gauge, corrected for slippage, produced by unit volume at 146° F. and 740 lbs. per sq. in. gauge.

$\frac{32.65}{0.995} = 32.81$ lbs. per sq. in. per 100 ft. pressure head of foam in section.

Friction head—using the Moore and Schilthuis equation:

$$\Delta P_{tr} = 0.00125 \times \frac{U_F \; S_F \; Z_L^{0.13}}{D}$$

Where:

U_F = linear velocity of foam.
S_F = density of foam.
Z_L = absolute viscosity of oil in centipoises.
D = diameter of tubing in inches.

$U_F = \frac{7.2 \times 5.62 \times 0.995}{60 \times 60 \times 0.0325} = 0.346$ ft. per sec.

$S_F = \frac{32.81 \times 144}{100 \times 6.24} = 0.758.$

Z_L = at a temperature of 122° F. from Figure 10 = 0.004 × 1,488 = 5.95 centipoises.

Correcting the viscosity for gas in solution from Figure 11 = 5.95 × .47 = 2.8 centipoises.

$$\Delta P_{tr} = \frac{0.00125 \times 0.346 \times 0.758 \times (2.8)^{0.13}}{2,441}$$

$\times 100 = 0.16$ lbs. per sq. in. per 100 ft.

$32.81 + 0.16 = 32.97$ lbs. per sq. in., the average pressure drop per 100 ft. for section pressure head of foam and friction head.

$\frac{200}{32.97} \times 100 = 607$ ft., the length of section.

The above calculations are repeated for additional sections with pressure drop of 200 pounds per square inch until the surface is reached. In this example the lengths of the other sections are:

540—340 lbs. per sq. in. gauge= 662 ft.
340—140 lbs. per sq. in. gauge=1,256 ft.

The length of each section is plotted with the corresponding pressure drop as in Figure 12 to determine the pressure at the surface. When the pressure at the beginning of a section is less than 200 pounds per square inch, the length of section should be calculated for the pressure available. It is not necessary, however, to calculate additional sections if the surface has been reached. If the surface pressure is above 50 pounds per square inch and the average temperature of the section is below 115° F., the 90° F. curve in Figure 9 should be used in place of the 146° F. curve. Under these conditions the pressure head of 1 unit volume of the gas-saturated solution is 34.5 pounds per square inch.

Where the velocity is less than 0.3 foot per second for the foam flow condition and less than 10 feet per second for the mist flow, slippage apparently becomes so great that a heading condition occurs, and under these conditions it is impossible to determine the actual flowing conditions or to calculate the pressure drop in the flow string. There is some deviation of the calculated data from the actual test data in Curve 1, Figure 12. This is a result of the fact that the linear velocity and ratio of gas to oil in the tubing were below the limits for steady flow and a heading condition existed. As previously stated, it is impossible to accurately calculate this type of flowing condition.

Although the "slippage factor" curves given in Figure 3 closely approximate the conditions encountered in the East Texas Field, it is hoped that additional experiments will furnish sufficient data so that slippage factors can be calculated for a broader range of conditions.

Minimum Flowing Pressures

The minimum pressure requirements at the bottom of the flow string for different rates of production, sizes of flow string, and surface back pressures are shown graphically by Figure 13. The curves for the 2½-inch tubing were constructed from actual tests, while for 2-inch it was necessary to supplement the test data with points calculated by the method previously described for calculating the pressure drop in flow strings.

The results of these tests indicate that the minimum bottom hole pressure required to sustain flow decreases as the rate of production is decreased, until the velocity in the flow string reaches a point where slippage becomes sufficiently large and there is not enough available energy to lift the oil. Under such conditions, part or all of the oil accumulates in the tubing, until the ratio of gas to oil is sufficient to lessen the effect of slippage, and to the point where the available energy will lift the oil which produces a heading condition. If there is not sufficient energy available to lift the accumulated oil, the well will cease to flow.

The minimum rate of production and pressure at the bottom of the flow string for 2½-inch tubing when the surface pressure is 20 pounds is obtained at a rate of 12 to 15 bbls. an hour. When the rate of production is less than this limit, slippage is great enough to cause heading, and the "bottom hole" pressure required to sustain flow increases. If the rate of production is less than 7 bbls. an hour, the heading becomes so pronounced, due to slippage, that the well will cease to flow until the "bottom hole" pressure increases to a point where it can overcome the pressure head of accumulated oil. The other curves in Figure 13 show the rates of production and minimum "bottom hole" pressure for different sizes of flow strings and surface pressures.

A comparison of the curves for 2½-inch and 2-inch flow strings show that a higher pressure is required to flow the same quantity of oil through 2-inch tubing. This is a result of the fact that a greater friction loss occurs in the smaller flow string. A lower rate of production, however, can be maintained in 2-inch tubing because the linear velocities are greater and the slippage losses, which are a function of the linear velocity, do not become great enough to cause a failure of flowing conditions until the same linear velocity is reached that caused flow failure in the 2½-inch tubing. It is estimated that the minimum rate of production for 3,600 feet of 2-inch tubing is 6 bbls. per hour with a pressure of 520 pounds per square inch, for East Texas conditions. The minimum pressure curve for a surface back pressure of 100 pounds per square inch shows less change in "bottom hole" pressure for change in rate of production, which is believed to be the result of the small amount of gas liberated from solution in the oil until the oil nearly reaches the surface, and therefore slippage losses play a very minor part in the pressure drop in the flow string under these conditions.

If data had been obtained for constructing the potential production curve of a well similar to those shown in Figure 2, it would be possible to predict, from the minimum pressure requirements given in Figure 13, the performance of the well as the reservoir pressure declines, providing the reservoir pressure is greater than 755 pounds per square inch absolute or 740 pounds per square inch gauge. The character of the potential production curves and the quantity of gas that will accompany each barrel of oil after the reservoir pressure reaches 755 pounds per square inch absolute is not known at the present time. Undoubtedly a different relationship will exist at that time as there will be both oil and gas flowing from the reservoir into the well.

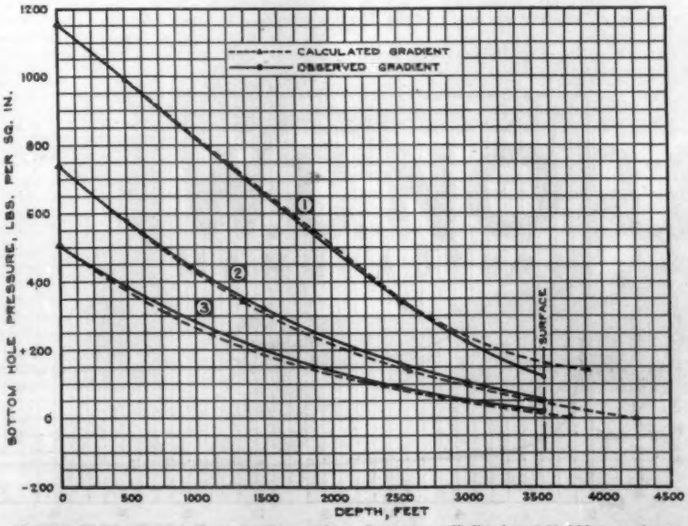


Figure 12—Pressure gradients in flow string. Curve 1, well flowing 6.01 bbls. per hour at surface. Curve 2, well flowing 44.81 bbls. per hour at surface. Curve 3, well flowing 26.31 bbls. per hour at surface

Illustration

Assuming for the purpose of illustration that two wells are tubed with 2½-inch tubing: Well A and well B with potential curves similar to Curves 1 and 3, Figure 2. If the reservoir pressure has declined to 800 pounds per square inch, the rates of production for pressures of 700-600-500 pounds per square inch at the face of the sand will be equivalent to those shown for pressure differentials of 100-200-300 pounds per square inch; and Curves A and B can be drawn as shown in Figure 13.

The curve of Well A indicates that it will not produce sufficient oil to flow through the 2½-inch tubing with 50 pounds back pressure but will flow through 2½-inch tubing with a surface back pressure of 20 pounds per square inch. Well A will flow through 2-inch tubing with a surface back pressure of 20 pounds per square inch but will fail to flow through 2-inch tubing with 50 pounds per square inch surface back

pressure. Well B will flow through both 2½ and 2-inch tubing at surface back pressures of 20 and 50 pounds per square inch, respectively. Neither well will flow with surface back pressures of 100 pounds per square inch through either 2 or 2½-inch tubing. Using these potential production curves, the performance of a well can be predicted for any reservoir pressure above 755 pounds per square inch, and for different sizes of tubing.

The use of these potential production curves in this manner is only possible because the gas energy accompanying each barrel of oil into the well will be constant until the reservoir pressure declines below 755 pounds per square inch. It will be observed, however, that these curves have been used for predicting flowing conditions where the actual pressure at the sand face is below 755 pounds per square inch absolute. It is thought that this is permissible as long as the reservoir pressure is above 755 pounds per square inch, under closed-in conditions, in as much as the greater part of the pressure drop within the drainage radius of the well occurs very near the sand face, and little or no by-passing of gas should occur under such conditions.

Swabbing to Start Flow

The point undoubtedly will be raised that these results indicate that wells can be flowed through 2½-inch and other tubing sizes at a lower reservoir pressure than the reservoir pressure now existing in certain wells which at the present time cannot be made to flow steadily. There are two reasons which would account for this condition. The first reason would be, that sufficient oil might accumulate in the well to produce a pressure head equivalent to the reservoir pressure. This type of well can be started to flowing by swabbing, and the well will continue to flow providing its potential production at flowing pressures is sufficient to maintain steady flow in the flow string.

For example, Well A, Figure 13, might have sufficient fluid accumulated in the well to produce a pressure head of 800 pounds per square inch. In that case, when the well is opened there might not be sufficient gas in solution in the oil to lighten the column of oil sufficiently to establish flowing conditions. The well, therefore, would have to be swabbed or started by some outside assistance.

The second condition which is responsible for a well not being able to flow its production although the reservoir pressure is above the minimum pressure requirements, indicated for the particular flow string in the well, is that it is producing from a very tight or thin part of the producing sand and the necessary pressure differential between the sand reservoir and the pressure at the face of the sand is so great that when, or if, sufficient fluid enters the well to exceed the minimum flow requirements necessary to maintain steady flow in the flow string, the pressure at the bottom of the well is too low to maintain flow. Such an example is shown by Curve X, Figures 2 and 13.

Intermittent Flow

In some wells of this type, producing from tight or thin parts of the sand, a much higher bottom hole pressure can be obtained while flowing than indicated by the potential production curve if the wells are operated intermittently.

While the well is closed in, the reservoir pressure within the effective drainage radius of the well is re-established. This excess pressure energy results in a higher rate of production and pressure at the face of the sand when the well is opened, continuing until it is dissipated and equilibrium under flowing conditions is re-established. Until equilibrium under flowing conditions is established, the production of the well will be greater than indicated by the potential production curve.

For example, Figure 14 shows the rate of production and sand face pressure relationship while Well No. 1, Figure 2, is reaching equilibrium flowing conditions. In this well when equilibrium conditions were reached, the bottom hole pressure was sufficient to maintain flow.

There are wells, however, where the "bottom hole" pressure and rates of production, after equilibrium conditions are established, are below the requirements necessary to maintain steady flow. In wells where the pressure and rate of flow are insufficient to maintain flow after equilibrium conditions are established but which produce an appreciable quantity of oil before these conditions are reached, the well often can be successfully produced by stop-cocking or by using a bottom hole choke; providing the "bottom hole" pressure builds up sufficiently to "kick the well off," while the well is closed in.

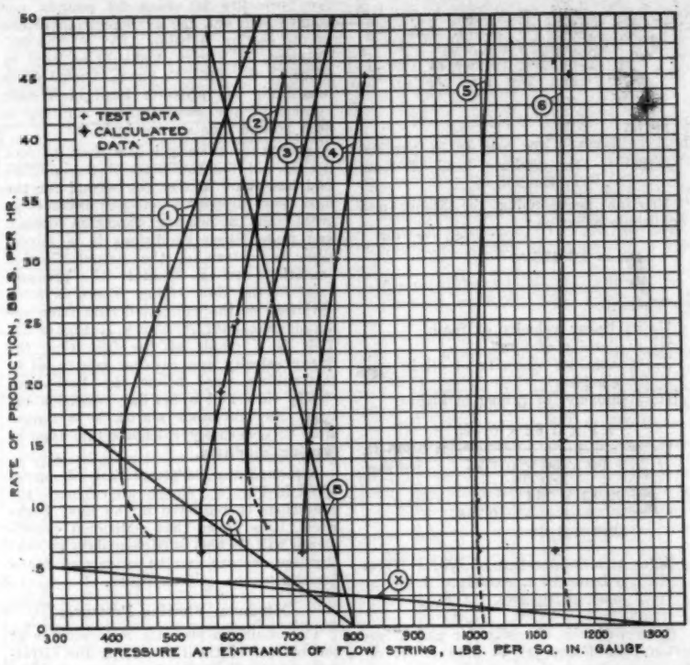


Figure 13—Minimum "bottom hole" pressures required to maintain flow in 3,565 feet of flow string in East Texas Field when reservoir pressure is above 740 pounds per square inch gauge. Curve 1, 2½-inch tubing surface pressure 20 pounds per square inch. Curve 2, 2-inch tubing surface pressure 20 pounds per square inch. Curve 3, 2½-inch tubing surface pressure 50 pounds per square inch. Curve 4, 2-inch tubing surface pressure 50 pounds per square inch. Curve 5, 2½-inch tubing, surface pressure 100 pounds per square inch. Curve 6, 2-inch tubing surface pressure 100 pounds per square inch. Dotted portion of curves indicate unstable flow

The "bottom hole" choke under these conditions restricts the flow and lengthens the flowing period before equilibrium conditions in the sand are established. If the well is operated continuously, however, equilibrium conditions will be established, and the rate of production at that time will be the same as indicated by the potential production curve regardless of whether or not a choke has been used.

In all wells, even though their potential production curve indicates that flow can be maintained, some provision must be made for "kicking the well off" after bottom hole pressure has declined past the point where it can no longer overcome the pressure head of oil that accumulates in the well while it is closed in.

Unfortunately, due to the lack of information and the correct analysis of conditions, many wells are pumped mechanically long before the minimum flow requirements are reached, because they do not have sufficient reservoir pressure to overcome the pressure head of oil which has accumulated in the well while closed in, or because the proper size of flow string is not used, or because of too great a surface back pressure.

The quantity of oil that will accumulate in the well after it is closed in depends upon the tightness of the surface fittings and the rate at which the "bottom hole" pressure becomes equalized with the reservoir pressure.

There are several ways of overcoming this pressure head of accumulated oil, the most common being accomplished by swabbing the well. Another method is by gas lift. And a comparatively new method that seems to have promising possibilities is the "bottom hole" valve whereby the flow string can be closed in at the bottom when the well is shut in, thereby preventing the building up of a column of oil in the flow string.

The selection of the proper size of flow string can be closely estimated by the use of the minimum pressure requirement curves in Figure 13 and by the calculation of pressure drop in the flow string suggested in this paper.

The proper selection of flow string also depends upon a knowledge of the potential production capacity of the well as determined from curves similar to those shown in Figures 1 and 2 which should be obtained for individual wells.

The importance and effect of surface back pressures are clearly indicated by the curves in Figure 13 which show the effect that increasing the surface pressure has upon the minimum "bottom hole" pressure requirements.

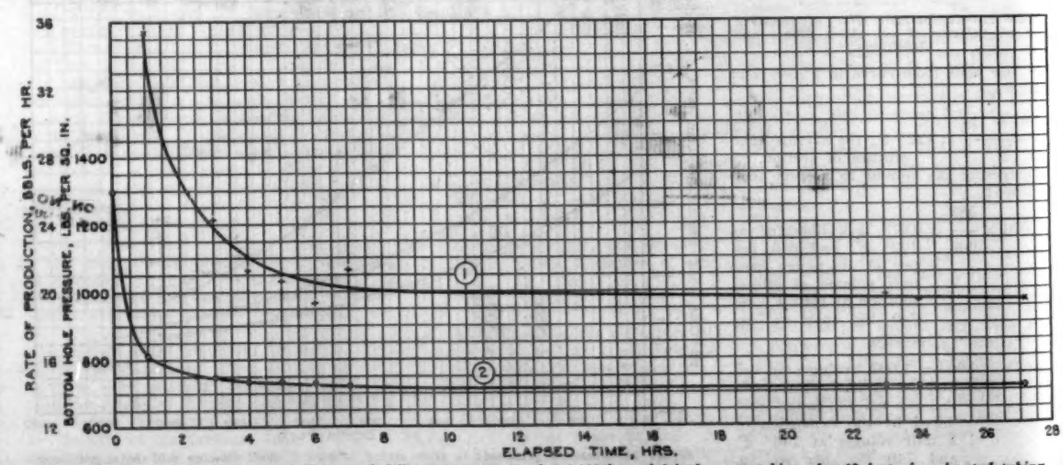


Figure 14—Rate of production and "bottom hole" pressure curves for 3,646 feet of 2-inch upset tubing plus 10 feet of perforated tubing. Curve 1, Rate of production; Curve 2, Bottom hole pressure. East Texas test No. 11, Sun Oil Co.'s No. 1 Schuler Joint "B" lease.

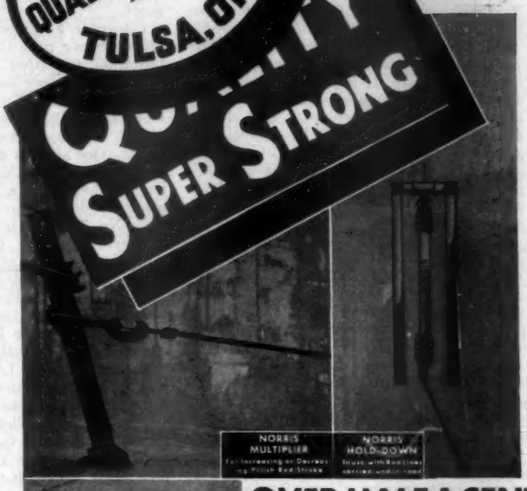
ROCKY MOUNTAIN RUNS

Average daily pipe line runs from fields in the Rocky Mountain territory for the week ending May 20 follow:

WYOMING	
Salt Creek	19,130
Big Muddy	1,870
Badger Basin	40
Byron Garland	200
Dutton Creek	70
Dallas-Derby	230
Elk Basin	560
Ferris	20
Frannie	240
Grass Creek	990
Greybull	0
Hamilton Dome	850
Hudson	330
La Barge	790
Lance Creek	190
Lost Soldier	2,040
Midway	80
Oregon Basin	100
Osage	710
Pilot Butte	30
Rex Lake	0
Rock River	810
Poison Spider	210
Teapot	20
Total Wyoming	29,420
MONTANA	
Buckley-Border	350
Cat Creek	750
Cut Bank	460
Dry Creek	160
Kevin-Sunburst	3,170
Lake Basin	60
Pondera	780
Total Montana	5,730
COLORADO	
Florence	220
Fort Collins and Wellington	650
Iles Dome	610
Moffat	620
Orchard	140
Rangely	70
Tow Creek	250
Total Colorado	2,560
NEW MEXICO	
Artesia	540
Caprock	992
Hogback	210
Jal	1,145
Table Mesa	60
Eunice	455
Hobbs	28,830
Lea	2,346
Texas-Pacific	91
Rattlesnake	632
Total New Mexico	35,301
Total Rocky Mountain area	73,011
Total previous week	74,996
Difference	1,985

W. C. NORRIS MANUFACTURER QUALITY PRODUCTS TULSA, OKLA.

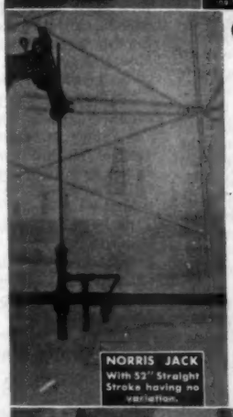
In East Texas



Today, NORRIS Pumping Equipment dominates the fields of East Texas, just as it has been chosen by the major companies in all important oil fields for over fifty-one years. NORRIS has never tampered with Quality, and because of this fact, the companies that have always specified — W. C. NORRIS, are today finding this equipment paying them dividends in longer life and more satisfactory service.

OVER HALF A CENTURY EXPERIENCE

Designed by men of long oil-country experience, NORRIS Pumping Equipment illustrated in use by the major companies has been especially built to meet the requirements of East Texas. All NORRIS Equipment is built to meet the individual requirements of the job and carries an *UNQUALIFIED GUARANTEE backed by over a half century oil country manufacturing experience.* Write us for complete descriptive material on any NORRIS Quality Equipment. If you have a special problem let our engineers work it out for you. Our Kilgore store is specially located to adequately serve East Texas — Use it. Make it your headquarters.



W. C. NORRIS
MANUFACTURER

SEND COUPON TODAY

East Texas Builds Tanks, Prepares for Pumping; North Texas Operators Are Holding Oil

By L. E. BREDBERG
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., May 22.—Purchasing companies continue to draw on the East Texas wells to fill their storage with the low-priced crude. More gathering lines are being constructed to augment those already in operation to capacity, one loading rack is being extended, and two others are under construction. Several hundred thousand barrels of steel storage are being erected for storage of the cheap oil, some of this storage being erected by the royalty and fee owners to hold the oil until it brings a better price.

The Stanolind company is preparing to install pumping equipment on 80 wells in the Carlyle area.

Sinclair Prairie is said to be getting ready to standardize 100 wells in the southern end.

Many new tanks are being built to store oil. Fee and royalty owners are building these tanks in a couple of areas, and others may follow this lead.

Barnsdall Oil Co. is the most active producer at present in tank construction. It is preparing to erect two 80,000-bbl. tanks near Harris Lake in the Longview area, Gregg County, and will erect six 10,000-bbl. tanks. It is also preparing to lay a gathering line to serve its leases, and may construct loading rack on the Texas & Pacific Railroad to load out its own oil.

Haynes Brothers are building one 80,000-bbl. tank and already have one erected on its Brown lease in the Joiner area. They will also build two 80,000-bbl. tanks on their Bishop-Lee lease in the Joiner area.

Superior Oil Co. is to build one 80,000-bbl. tank on its Jones lease in the Longview area, Gregg County, and Tytex Pipe Line Co., a Murchison company, is building its second 55,000-bbl. tank near Harris Lake in the Longview area.

J. A. Wood has completed one 10,000-bbl. tank on his Sanders lease in the Gladewater townsite, western Gregg County, and Harry Hanbury is building one 37,500-bbl. tank on his Vickers lease in this area. Bradley Refining Co. will build one 55,000-bbl. tank at its plant in Gladewater. Foshee Refining Co. has just completed one 37,500-bbl. tank at its Gladewater plant, also.

Bailey and Trimble have leased four 55,000-bbl. tanks from the Kettle Creek Refining Co., receiver at Eldorado, Ark., and will use them for storage of East Texas crude.

Jim Bond is to build two 10,000-bbl. tanks, and Petroleum Pipe Line & Storage Co. is to build two 55,000-bbl. tanks at Gladewater.

The Skeen Gathering System and Professional Pipe Line Co. are building gathering systems in the Joiner area. G. W. Arrington and Mr. Jenkins are building a 15-car loading rack at Arp. These companies will connect their gathering systems with this rack.

Extending Rack

Danciger Refineries, Inc., which has a 10,000-bbl. refinery south of Longview, in Gregg County, and a 52-car loading rack which has four spills to each car, is extending this rack to serve 30 additional cars.

George Demontrand is building one 80,000-bbl. tank on his Pinkston lease in the Joiner area. Superior Oil Co. is also building one 80,000-bbl. tank on its Ingram lease in the Longview area.

Champlin and Bass are erecting two 55,000-bbl. tanks on their Watson lease in the Caruthers Survey, near Kilgore.

Union Refining Co. is grading for a 200,000-bbl. open fuel pit at its refinery at Camps Switch, and Danciger Refineries, Inc., has just completed a 500,000-bbl. open fuel oil tank at its Longview plant.

F.H.E. Oil Co. is erecting one 37,500-bbl. tank on its Christian lease in the Hooper Survey, Gregg County.

Jones and O'Brien are building two 80,000-bbl. tanks and will erect three more on their Hughey and Ross lease in the Kilgore area. East Texas Refining Co. is building one 80,000-bbl. tank on its Fisher lease in Gregg County, and Prince Brothers are building one 55,000-bbl. tank on their Orr lease in the Longview area of Gregg County.

S. S. Laird, landowner and royalty owner of Kilgore, is preparing to erect two 55,000-bbl. tanks on the Humble Oil & Refining Co.'s "B" lease in the Mary Van Winkle Survey, Gregg County, rather than let his oil go at 25 cents per barrel.

L. O. McMillan has erected one 37,500-bbl. tank east of Overton to store his own oil.

Atlantic Pipe Line Co. is equipping two more stations on its East Texas-Gulf Coast 10-inch main line, and installing equipment to increase capacity of its Zavalla station. It is installing three Cooper-Bessemer, 350-horsepower Diesel engines in a new station erected at Enterprise, 9 miles south of Henderson, and the same number of engines in its Silsbee station. These engines will drive 250 k.v.a. 2,400-volt General Electric motors, which will furnish energy to two 350-horsepower, motor-driven centrifugal pumps. Capacity of these stations will be 43,000 bbls. per day against 800 pounds pressure. It is also increasing the capacity of its Zavalla station by installing one engine and generator and changing motors and pumps in this plant. The company is now running an average of around 30,500 bbls. per day through this line, and this new equipment will step up the capacity to around 13,000 bbls. more.

There are now 72 loading racks in the East Texas Field and 42 refineries operating. There are six other plants not yet completed, or shut down, and five others under construction.

Bottom hole pressures continue to decrease in the field, every week registering around 30 pounds decline on all wells, some of them falling off more rapidly than others, depending upon their location in the field and position on structure. East edge wells are going off fastest, especially in the low pressure Joiner area of Rusk County. It is in this area that a vast amount of activity is being shown in rigging up pumping equipment, nearly all companies erecting standard fronts, powers and other pumping units on their leases in the area.

No check has yet been made of the number of "dead" wells in the field, owners not reporting same and taking the allowable of these wells from others on the same leases. Engineers estimate there are at least 500 of these wells, and no pumping equipment will be rigged on them until the entire lease goes dead and all wells thereon have to be pumped. Smaller operators, in many instances, cannot afford to rig up pumping equipment on their leases, which is one reason for more wells not being reported on the pump. They will eventually have to equip these leases with artificial lifting equipment.

Governor Ferguson signed the bill imposing heavy penalties for continued violation of proration orders, even a penitentiary sentence for flagrant violations.

There were 19 field locations staked in East Texas this week and 18 wells completed. Four wildcat tests were abandoned. One shallow test north of the Van Field, Van Zandt County, was abandoned but another made a small producer. Another wildcat abandoned was Sun Oil Co.'s No. 1 White in the J. M. Hallmark Survey, Freestone County. It encountered salt water at 4,760 feet. Other wildcats abandoned were in Upshur and Wood Counties. Four wildcat locations were staked offsetting the completed failures. These were in Hopkins, Hunt, Morris and Titus Counties.

Petroleum Pipe Line & Storage Co.'s No. 1 Mrs. S. S. McGee, in the William Daniel Survey, in the Nacatoch sand area north of the Van Field, Van Zandt County, was completed for an initial production of 20 bbls. at total depth of 1,277 feet. The Nacatoch was topped at 1,240 feet in this, the second shallow producer in this area. Orbit Oil Corp.'s No. 1 Moore Grocery Co., same survey, was dry, total depth 1,420 feet.

Wadley, Lyons, Taubel and others have completed their No. 1 Shuttlesworth, in the James M. Dunn Survey, Jamestown area of Upshur County, as a small producer, opening a separate pool after drilling a series of five tests on a large block held by a group of independent operators. The area is separated from the East Texas Field by only a few miles. Four other tests had good showings of oil and gas, salt water drowning these out. The well topped the sand at 3,722-24 feet and made a 25-bbl. pumper at minus 3,420 feet, or at a greater depth than wells are completed in East Texas.

East Central Texas Wildcats

Week Ending May 22

ANGELINA COUNTY

Company, well, farm name, section and block—	Remarks:
Smith and LaRue et al's No. 1 Colmorgan, 150 ft. N of American Liberty Oil Co.'s No. 1 Colmorgan, T. Messingill Sur.	Testing 1,008 ft.

CHEROKEE COUNTY

Wilson & Stubbs' No. 1 L. Robert, 450 ft. from S and 150 ft. from W line of lease, J. B. Wolfin Sur.	Prepare to deepen; T.D. 4,899 ft

FREESTONE COUNTY

Clyde Creighton's No. 1 Holley Bros., 854 ft. from W line and center of N and S lines of lease, A.B.M. Sur.	T.D. 4,507 ft.

GREGG COUNTY

Ray Oil Corp.'s No. 5 J. M. Wheeler, 150 ft. due N of Pelphrey Bros.' No. 1 Wheeler, D. Ferguson Sur.	Derrick.
Jim Bond's No. 2 C. Fisher, 3,600 ft. from N line and 3,700 ft. from W line of survey, J. Ruddle Sur.	Derrick.
C. H. Brown's No. 1 D. M. Johnson, 5,690 ft. from N line and 3,400 ft. from W line of survey, G. W. Hooper Sur.	Drlg. 1,500 ft.
Cosby et al's No. 1 L&G.N.R.R., 7,100 ft. from N line and 4,710 ft. from W line of survey, M. V. Winkle Sur.	Waiting on cmt. to set 3,536 ft.
Gulf Production Co.'s No. 6 Fonville, 330 ft. from N line and 1,152 ft. from W line of lease, William Tyndale Sur.	Rig up.
Humble Oil & Refining Co.'s No. 11 J. F. Boles, 2,020 ft. from S line and 319 ft. from W line of survey, D. Ferguson Sur.	Rig up.
J. S. King's No. 1 fee, 3,590 ft. from N line and 4,360 ft. from W line of survey, M. V. Winkle Sur.	Drlg. 2,934 ft.
Lion Oil & Refining Co.'s No. 2 Evans, 8 offset to Sinclair Prairie's No. 10 Williams, P. McAnnelly Sur.	Derrick.
C. H. Lyons' No. 1 W. Smith, 1,400 ft. from N line and 2,470 ft. from W line of survey, J. S. Carrithers Sur.	Waiting on cmt. to set; T.D. 3,666 ft.
Ray Drilling Co.'s No. 2 Tubbs, 150 ft. from W line of lease in D. Sanchez Sur.	Waiting on standard rig; will not flow; T.D. 3,585 ft.
P. H. Stanford's No. 1 North Chapel, 70 ft. from N line and 1,070 ft. from W line of survey, M. Tennison Sur.	Rig up and S.D.
Shell Petroleum Corp.'s No. 6 P. M. Bates, 386 ft. N of No. 4 and midway between E and W lines of lease, M. V. Winkle Sur.	Drlg. 3,250 ft.

(Continued on Page 44)

WEST TEXAS

Landreth Production Co. and Texas Co.'s No. 1 Holt in Section 16, Block 43, Township 1n, T.&P. Survey, northern Ector County, is drilling at 4,150 feet in lime with no showings. It is running low in comparison to Stanolind Oil and Gas Co.'s wells to the south. Landreth and Texas Co.'s No. 1 Holt in Section 15, to the west of the present drilling test, was completed some time ago for only a 100 bbl. well at 4,627 feet. The present test will give evidence as to where the better production is to be found in this area, consequently will be closely watched for results.

Stanolind Oil and Gas Co.'s No. 1 Cowden, Section 26, Block 43, Township 2s, T.&P. Survey, north offset to the Addis discovery well, is rigging up standard tools to clean out. It may be given a shot to increase the output, which is around 127 barrels per day. Total depth is 4,042 feet. It was treated with 1,500 gallons of acid from 3,816-4,042 feet, which did not bring about a well as large as expected.

Moran Drilling Co. has completed a deal with Barnsdall Oil Co. on acreage in Section 12, Township 1s, T.&P. Survey, same county, and has spudded a test 330 feet from the north and west lines of the section.

Ward County

Humble Oil and Refining Co.'s No. 1 L. Richter and others in Section 27, Block 34, T.C.R.R. Survey, southeastern Ward County, is shut down at 2,445

feet after a 40,000,000 foot gas blowout. This well is approximately 1½ miles northwest of production and is a much different type of well than encountered in this area. Most of the wells are small oil wells with a little gas.

H. O. Wooten's No. 2 Texas-Edwards, southeast quarter of Section 17, Block 33, Township 2s, T.&P. Survey, Glasscock County, is drilling at 2,180 feet in lime with 600 feet of oil in the hole at 2,170 feet. This test is a couple of locations west of the company's No. 1 which made 500 barrels at 2,179 feet, and marks a short extension west of the main part of the field.

Wahlenmaier Petroleum Co.'s No. 1 Hughes in Section 23, C.&M. Survey, in north Reagan County, was abandoned at a total depth of 3,021 feet. This wildcat was first considered as an Ordovician test, but will not be carried any deeper than where sulphur water was struck.

Reeves County

Merry Bros. and Perini have made location for a wildcat on the H. H. Johnson ranch, Section 5, Block 4, H. &G.N. Survey, on a block of acreage between Brant and Lucerne and north of Pecos City, in Reeves County.

There were 2 completions in West Texas during the week; both dry holes. Stanolind Oil and Gas Co. and others abandoned No. 1 Todd, Ordovician test in Section 67, Block UV, G.C.&S.F. Survey, Crockett County. Total depth is 8,042 feet.

Superior Oil Co. abandoned No. 1 R. Massie, Section 14, Block UV, G.C.&S.F. Survey, Crockett County, at a total depth of 1,432 feet, failing to pick up shallow production found in Stanolind Oil and Gas Co. and Continental Oil Co.'s wells to the northwest. Superior Oil Co. drilled this shallow test in an effort to validate leases on block, just as the other companies did on blocks held by them. Superior is expected to drill an Ordovician test on the block, but definite information has not yet been gained.

Gulf Production Co.'s O'Brien area in Ward County has been defined on the west by Atlantic Oil Producing Co.'s dry hole in Section 3, Block 16, University lands. Water was encountered at 2,720 feet.

There were no locations staked in the Permian Basin during the week.

WICHITA FALLS

Low crude prices have slowed up activities and checked the staking of locations in the Ranger and Wichita Falls districts, and cheap East Texas crude is being shipped in to some refineries because many operators and companies are shutting in their properties and refusing to sell their high gravity oil at such low prices. One refinery contracted for 60,000 bbls. of East Texas oil, and another contracted for 1,000 bbls. per day over a short period.

As long as tests are drilled in these two areas new pools or extensions will be found. W. B. Omohundro and others have opened a new pool in an area in which 10 dry holes and 2 small producers were formerly drilled. This well is on the J. H. Turbeville ranch, approximately 8 miles west of Archer City in Archer County, Section 35. It is estimated good for 150 bbls. per day from sand logged at 1,476-79 feet. Under good conditions such a strike would precipitate an active drilling campaign.

Duncan-White and others have opened another producing area in north central Young County, with No. 1 Smith in the SE cor., Section 1,365, T.E.&L. Survey, 6 miles southeast of Olney. It opens a shallow sand area, the well producing from sand cored at 710-12 feet. Estimates place the well's potential around 50 bbls.

Lawson Oil & Gas Co. of Tulsa has made a deal with Shell Petroleum Corp. to drill an Ellenberger lime test on the Bertha Henderson farm in the B. Brown Survey, Abstract 14, northeast Clay County. Derrick is up on a block formerly core drilled by the major company before it closed on the block.

Runs in the Wichita Falls district continue to decrease. This week's figures show a drop of 806 bbls. per day, probably due to the shutting in of more wells or running of more oil to storage.

A daily average of 49,802 bbls. was run this week, whereas last week the daily average was 50,608 bbls.

PANHANDLE DISTRICT

There were seven wells completed in this district during the week, five in Gray County, two of which were old wells deepened and recompleted. One well was completed in Hutchinson and one in Wheeler County. There were five locations staked, all in Gray County, three being old wells to be drilled deeper.

Production in the district showed a daily decrease of 557 bbls. this week. The daily average reports showed runs down to 43,123 bbls.

COMPLETIONS IN EAST TEXAS

North Gregg County

Atlantic Oil Production Co.'s No. 4-B A. Tooke, top sand 3,560 feet, initial production 64 bbls. per hour through open tubing, total depth 3,628 feet. Jim Bond's No. 1-C Fisher, top sand 3,474 feet, initial production 80 bbls. per hour through open tubing, total depth 3,493 feet. Cal-Pet Oil Co.'s No. 5 B. Jones, top sand 3,607 feet, initial production 105 bbls. per hour through open tubing, total depth 3,669 feet. Gulf Production Co.'s No. 12 S. C. Fishburn, top sand 3,474 feet, initial production 90 bbls. per hour through open tubing, total depth 3,505 feet. W. R. Jones' No. 3 Doby, top sand 3,726 feet, initial production 90 bbls. per hour through open tubing, total depth 3,742 feet. Magnolia Petroleum Co.'s No. 16 Everett, top sand 3,661 feet, initial production 50 bbls. in 15 minutes through 1¼ inch tubing choke, total depth 3,619 feet. St. Jude's No. 1 Samperi, top sand 3,566 feet, initial production 95 bbls. per hour through open tubing, total depth 3,574 feet.

South Gregg County

George W. Foster's No. 1-E Carr, top sand 3,467 feet, initial production 75 bbls. per hour through 1 inch tubing choke, total depth 3,585 feet.

Gulf Production Co.'s No. 5 S. G. Andrews, top sand 3,577 feet, initial production 80 bbls. per hour through open tubing, total depth 3,592 feet.

North Rusk County

Chicago Oil Co.'s No. 2 C. O. Christian, top sand 3,737 feet, initial production 120 bbls. per hour through ¾-inch tubing choke, total depth 3,746 feet. Humble Oil and Refining Co.'s No. 16 J. N. Peterson, top sand 3,647 feet, initial production 75 bbls. per hour through ¾-inch tubing choke, total depth 3,683 feet; No. 7-C Sexton, top sand 3,714 feet, initial production 105 bbls. per hour through ¾-inch tubing choke, total depth 3,738 feet. Westheimer and Daube's No. 4 Brightwell, top sand 3,592 feet, initial production 39 bbls. in 30 minutes through ¾-inch tubing choke, total depth 3,606 feet.

South Rusk County

Humble Oil and Refining Co.'s No. 1 Maggie Watkins, top sand 3,580 feet, initial production 15 bbls. per hour through open tubing, total depth 3,700 feet. Hunt Production Co.'s No. 3-A Joe Lee, top sand 3,740 feet, initial production 75 bbls. in 30 minutes through open tubing, total depth 3,747 feet. Mid-Kansas Oil and Gas Co.'s No. 5 Kangerga Brothers, top sand 3,604 feet, initial production 112 bbls. per hour through 2-inch lead line, total depth 3,650 feet.

Upshur County

B. F. Phillips' No. 1 Carrie Brooks, top sand 3,607 feet, initial production 60 bbls. per hour through open tubing, total depth 3,615 feet. Rogers Brothers' No. 4 E. H. Brawley, top sand 3,650 feet, initial production 75 bbls. per hour through open tubing, total depth 3,660 feet.

WILDCAT COMPLETIONS

Upshur County

F. A. Fuller and others' No. 1 Shuttlesworth, top sand 3,723 feet, base 3,741 feet, top Pecan Gap 2,310 feet, base 2,990 feet, dry and abandoned, total depth 3,772 feet. (James Dunn Survey). Pat Hudson and others' No. 1 D. F. Smith, top Pecan Gap 2,360 feet, base 2,862 feet, top Austin chalk 2,627 feet, base 3,663 feet, top sand 3,663 feet, dry and abandoned, total depth 3,710 feet. (John Denson Survey). Orr and Newsom's No. 1 D. F. Smith, junked and abandoned, total depth 2,680 feet. (J. R. Davis Survey).

Wood County

Hull and Short's No. 1 T. H. Patterson, dry and abandoned, total depth 3,483 feet, elevation 421 feet. (W. B. McNutt Survey).

Van Zandt County

Orbit Oil Corp.'s No. 1 Moore Grocery Company, dry and abandoned, total depth 1,420 feet. Petroleum Pipe Line Co.'s No. 1 Mrs. S. S. McGee, top sand 1,240 feet, initial production 20 bbls. per day, pumping, total depth 1,277 feet.

COMPLETIONS IN WEST TEXAS

Crockett County

Stanolind and others' No. 1 Todd, total depth 8,042 feet, plugged back to 7,720 feet, dry and abandoned. Superior Oil Co.'s No. 1 Massie, dry and abandoned, total depth 1,432 feet.

COMPLETIONS IN PANHANDLE

Gray County

Cantone Oil Co.'s No. 2 Morse, abandoned location. Gulf Production Co.'s No. 7-A Bowers (old well drilled deeper), initial production 135 bbls. on pump, total depth 3,094 feet. Parton and Holt's No. 4 Morse, total depth 2,804 feet, plugged back to 2,630 feet, pay 2,572-75 feet, initial production 7 bbls. per day with 675,000 feet of gas. Phillips Petroleum Co.'s No. 4 Palmer (old well drilled deeper) initial production 240 bbls. oil first 24 hours on pump, total depth 3,022 feet. Sun Oil Co.'s No. 1-B Combs-Worley, pay 3,010-35 feet, initial production 604 bbls. oil per day on gas lift, total depth 3,050 feet. The Texas Company's No. 8 Faulkner (old well drilled deeper), pay 2,961-64 feet, initial production 199 bbls. in 24 hours, total depth 2,964 feet.

Hutchinson County

Phairs Oil Co.'s No. 5 Smith, abandoned location. Harry Stekol's No. 2 G. A. Whittenburg, pay 3,000-05 and 3,010-30 feet, initial production 40 bbls. per day, total depth 3,035 feet.

Oldham County

Amalgamated German and others' No. 1 Morton, abandoned location.

Wheeler County

R. R. Osborne's No. 1-A George Admire, gas 2,120 feet, increase 2,152-60 feet, initial production 1,000,000 feet of gas, total depth 2,167 feet.

Wildcat Operations in West Texas

Week Ending May 22

BREWSTER COUNTY

Company, well, farm name, section and block—	Remarks:
Joiner's No. 1 McIntire, 853 ft. from S and 2,590 ft. from E, Sec. 31, Blk. 352, W. J. Mitchell Sur.	Underreaming csg. 800 ft.

CONCHO COUNTY

Beasley et al's No. 1 Waring Estate, 400 ft. from N and E, Sec. 163, T.&N.O. Sur.	T.D. 2,586 ft.; pumping 5 bbls. oil per day and some water.

CRANE COUNTY

Loffland Bros.' No. 1 Tubbs, 1,324 ft. from N line and 1,320 ft. from W line of Sec. 9, Blk. B-27, P.S.L. Sur.	Material on ground.

CULBERSON COUNTY

Miller Bros.' No. 1 fee, 1,980 ft. from N line and 660 ft. from E line of Sec. 61, Blk. 97, P.S.L. Sur.	T.D. 520 ft.

ECTOR COUNTY

Cherry et al's No. 1 Johnson, 1,320 ft. from S line and 660 ft. from E line of Sec. 41, Blk. 43, Twp. 1s, T.&P. Sur.	S.D. 3,100 ft.
L. C. Harrison et al's No. 1 Addis, 330 ft. from N and 1,320 ft. from W, Sec. 35, Blk. 43, Twp. 2s, T.&P. Sur.	Flowing average of 275 bbls. oil per day to tanks; T.D. 4,061 ft.
Landreth Prod. and The Texas Company's No. 1 Holt, 660 ft. from S line and 3,025 ft. from E line of Sec. 16, Blk. 43, Twp. 1n, T.&P. Sur.	Cmtd. csg. 3,994 ft.
Stanolind O. & G. Co.'s No. 1 Cowden, 330 ft. from S and 1,320 ft. from W, Sec. 26, Blk. 41, Twp. 2s, T.&P. Sur.	Rigging up standard tools 4,042 ft.
Thomas et al's No. 1 Edwards, 330 ft. from S, 2,310 ft. from E, Sec. 38, Blk. 43, Twp. 3s, T.&P. Sur.	Set casing at 3,327 ft.
Fred Turner's No. 1-A Addis, 1,650 ft. from N line and 2,200 ft. from E line of Sec. 35, Blk. 45, Twp. 2s, T.&P. Sur.	Drlg. 1,720 ft.

FISHER COUNTY

Cranfill & Reynolds' No. 2 George, 330 ft. from N and W lines of NE of Sec. 200, Blk. 1, B.B.B.&C. Sur.	Fishing 2,090 ft.
Southern Oil Co.'s No. 1 Beavers, 330 ft. from W and 660 ft. from S of S half of SW Sec. 193, B.B.B.&C. Sur.	Drlg. 1,830 ft.

GARZA COUNTY

F.H.E. Oil Co.'s No. 1 Stoker	T.D. 2,909 ft.

GLASSCOCK COUNTY

Humble Oil & Refining Co.'s No. 1 Washer, 330 ft. from N line and 330 ft. from E line of Section 26, Blk. 33, Twp. 2s, T.&P. Sur.	Csg. 2,085 ft.
H. O. Wooten's No. 2 W. P. Edwards, 1,650 ft. from E line and 330 ft. from S line of Sec. 17, T.&P.R.R. Sur., Blk. 33, Twp. 1s	Drlg. 2,095 ft.

HOWARD COUNTY

M. D. Bryant et al's No. 1 L. C. Denman, 2,310 ft. from S and W lines of Sec. 10, Blk. 30, Twp. 1s, T.&P. Sur.	Underreaming 1,767 ft.
Eppenauer et al's No. 1 Leatherwood, C of SE of NW, Sec. 25, Blk. 33, Twp. 1n, T.&P. Sur.	Material on ground.
L. C. Harrison's No. 4 L. C. Denman, 2,370 ft. from the E line and 2,325 ft. from S line of Sec. 10, T.&P.R.R. Sur., Blk. 30, Twp. 1s	Drlg. 620 ft.
Mid-Continent Pet. Co.'s No. 2 Denman, 330 ft. from S and E of Sec. 10, Blk. 30, Twp. 1s, T.&P. Sur.	Cleaning out 2,809 ft.
Myers et al's No. 1 Denman, 2,305 ft. from S and 2,320 ft. from E, Sec. 14, Blk. 30, Twp. 1s, T.&P. Sur.	T.D. 2,852 ft.; S.D.; show oil 2,780 ft.
Sinclair Prairie Oil Co.'s No. 1 Denman, 330 ft. from N line and 330 ft. from W line of Sec. 14, Blk. 30, Twp. 1s, T.&P. Sur.	Drlg. 2,675 ft.
Sinclair Prairie Oil Co.'s No. 6 Dodge, 330 ft. from S line and 330 ft. from W line of Sec. 11, Blk. 30, Twp. 1s, T.&P. Sur.	Drlg. 2,615 ft.
Sinclair Prairie Oil Co.'s No. 5 Dodge, 2,310 ft. from N and 330 ft. from W, Sec. 11, Blk. 30, Twp. 1s, T.&P. Sur.	Cleaning out 2,815 ft.
Jack Wallace et al's No. 1 Scott, 990 ft. from N and 330 ft. from E lines of Sec. 92, Blk. 32, W.&N.W. Sur.	Show oil 1,347-51 ft.; to shoot; T.D. 1,387 ft.

JONES COUNTY

Condor Pet. Co.'s No. 1 Holt, 1,980 ft. from S and 1,650 ft. from W, Sec. 4, Blk. 30, T.&P. Sur.	Moving in machine.
Dyer's No. 1 Odom, 200 ft. from S and 170 ft. from W of N 320 acres, G. Zumwalt Sur.	Moving in tools.
Johnson's No. 1 Huddleston, 165 ft. from S and W of N half of N half of Sec. 39, Blk. 15, T.&P. Sur.	Running casing 2,595 ft.

LOVING COUNTY

L. & M. Pet. Corp.'s No. 1 Wheat, 2,310 ft. SW, 990 ft. SE, Sec. 71, Blk. 1, W.&N.W. Sur.	Cellar.

(Continued on Page 45)

National Oil Scouts Association Holds Convention at San Antonio, Texas

SAN ANTONIO, Tex., May 22.—Tom H. Terry of The Texas Company was elected president of the National Oil Scouts Association at the closing business session of the tenth annual convention here. The only other candidate for the presidency was Claud A. Strahan of the Atlantic Oil Producing Co. from Shreveport, La., who was re-elected first vice president. Other officers elected were: H. T. Carpenter, of the Mid-Kansas Oil & Gas Co., second vice president; C. O. Falk of the Humble Oil & Refining Co., secretary-treasurer, and Jesse L. Bullard of the Shell Petroleum Corp., chairman of the executive committee.

About 400 oil scouts gathered for the convention, discussed policies and plans, listened to some addresses, beat the geologists in a baseball game and enjoyed a big barbecue. Invitations came in from Shreveport, Houston, Corpus Christi, Dallas and Fort Worth for the next convention, and this matter will be settled later by the executive committee.

The retiring officers were L. S. McGee of the Humble Oil & Refining Co., Houston, president; J. W. Selby of Houston, secretary and treasurer, and G. C. Francisco of Houston, chairman of the executive committee.

TOM H. TERRY
The Texas Company
President

JESSE L. BULLARD
Shell Petroleum Corp.
Chairman Executive Committee

CLAUDE A. STRAHAN
Atlantic Oil Producing Co.
First Vice President

C. O. FALK
Humble Oil & Refining Co.
Secretary-Treasurer

H. T. CARPENTER
Mid-Kansas Oil & Gas Co.
Second Vice President

Oil Dictatorship Bill Is Sidetracked by Committee

(Continued from Page 7)

of settled production to establish a minimum price no less than the average cost of such wells and in determining when such abandonment would be premature, and to take into consideration the interests of the purchasing and consuming public and the oil industry as a whole.

The secretary is directed to limit petroleum imports to the daily average during the last six months of 1932.

The investigation of monopolistic practices, investigation of the feasibility of divorcing pipe lines from affiliated refineries or holding companies, devising practical means for attaining such divorce and initiation of rates and regulations on transportation and storage, power to seek injunctions against violators, recommendations to the states that they enact uniform conservation laws, including control of drilling and producing, retention underground of crude petroleum whose production would be in excess of the market demand, equitable apportionment to owners of a common source of oil and authorization for unit operation are other provisions in the bill.

A tax of 50 cents per barrel in addition to all other taxes is levied upon all petroleum produced in excess of the market demand as established by the secretary. A tax of one-fourth of a cent per barrel is levied upon all petroleum produced in acceptance with the market demand the proceeds of this tax to be used in providing funds to meet expenses incurred in enforcement of the measure.

Fines from $1,000 to $5,000 with imprisonment of one year to five years are provided for individual violators of this act, while corporations violating it are to be subject to fines from $5,000 to $10,000 for each day of such violation.

BUY BRITE STAR STATIONS

NEW YORK, May 20.—Vacuum Oil Co., Inc., one of the operating subsidiaries of the Socony-Vacuum Corp., has purchased the Brite Star Oil Co. of Akron, Ohio, wholesale and retail marketers of gasoline and other refined petroleum products. The Brite Star company has capital of $150,000.

DEPTH WAS 10,588 FEET

In the advertisement of the Regan Forge & Engineering Co., on page 36 of the issue of The Oil and Gas Journal of May 4, the depth mentioned under the photograph was stated incorrectly. The figure should have been 10,588 feet.

CHANGE NAME OF COMPANY

The Danciger interests have changed the name of the company formerly operating as the Petroleum Refractionating Co. to Danciger Refineries, Inc. The company operates a 10,000-bbl. skimming plant near Longview in the East Texas Field and a 6,500-bbl. skimming and cracking plant at Pampa, Tex. There has been no change in the officers.

TEXAS PIPE LINE TAX

AUSTIN, Tex., May 22.—The Texas house Monday passed the bill to declare gas pipe lines common carriers, and to extend the intangible tax levy to oil and gas pipe lines.

East Central Texas Wildcats

(Continued from Page 42)

Sun Oil Co.'s No. 4-A Allen Tooke, 450 ft. from W line and 6,880 ft. from S line of survey, W. H. Castleberry Sur. ..... Drlg. 324 ft.

Reed et al's No. 1 State, 5,000 ft. from N line and 1,120 ft. from W line of survey, State Land Sur. ..... Drlg. 2,640 ft.

L. W. Tarkington's No. 1-A Mrs. A. M. Greggston, 187 ft. N of Johnston's No. 1 Greggston and center of N and S lines of lease, M. Dillard Sur. ..... Derrick.

The Texas Company's No. 18 M. T. Cole, 4,150 ft. E and 500 ft. N of most easterly SW cor. of survey, E. L. Walker Sur. ..... Drlg. 3,430 ft.

M. E. Trapp's No. 1 R. B. White, 430 ft. N and 50 ft. E of SW cor. of Magnolia's White tract and survey, D. Moore Sur. ..... Top sand 3,495 ft.; T.D. 3,516 ft.

Yeager et al's No. 1 Howard, 660 ft. E of Harry Lewis' No. 1 King, Mary Scott Sur. ..... Rig up.

Simms Oil Co.'s No. 2 B. Wood, 2,770 ft. from N line and 188 ft. from W line of survey, J. Skillern Sur. .. Derrick.

HILL COUNTY

Spikes et al's No. 1 Holman, 150 ft. from NW cor. of 100-ac. tract, one-half mile S of Mt. Calm, Latham Sur. ..... Rig up.

HOPKINS COUNTY

E. P. Corley's No. 1 Jumper ..... Moving in rig; T.D. 1,630 ft

Culberson & Lynch's No. 1 Louis Stribling, 150 ft. from NW cor. of tract and lease, Thomas Norris Sur. .. Rig up.

Delworth-Hogan and Ashby's No. 1 Logan, 250 ft. from S and E lines of 175-ac. tract, A. L. Wetman Sur. .. Rig up.

HUNT COUNTY

Solar Exploration Co.'s No. 1 Smith, 210 ft. from E line and 370 ft. from S line of lease, William Glass Sur. ..... Drlg. 350 ft.

KAUFMAN COUNTY

Sisy-Bentley-Brewer et al's No. 1 J. B. Hunter, 300 ft. from S line and 150 ft. from SE line of 500-ac. tract, 4 miles S of Terrell, R. Sowell Sur. ..... Drlg. 1,050 ft.

LIMESTONE COUNTY

C. C. Curtis et al's No. 1 Emma Daniels, 150 ft. from W line and 150 ft. from S line of 42.5-ac. tract in Pedro Varela Sur. ..... Set surface csg. 60 ft.

MORRIS COUNTY

Doctor Beeler et al's No. 1 B. C. McCullum, 150 ft. from W line and midway between N and S lines of 29-ac. tract, S. A. Loving Sur. ..... Derrick.

RED RIVER COUNTY

Ajo Oil Co.'s No. 1 Nickels & Daniels, center of S 780 acres of 1,808-ac. tract, 8 miles N of English, Hugh B. Shaw Sur. ..... Derrick.

RUSK COUNTY

Combined Oil Co.'s No. 14 G. W. Eaton, 330 ft. from S line and midway between Nos. 6 and 9, F. Cordova Sur. ..... Derrick.

Griffin & Barnes' No. 1 fee, 12 ft. from S and W lines of 3-ac. tract, J. B. De Cadena Sur. ..... Waiting on cmt. to set.

Gulf Production Co.'s No. 7 C. H. Grissom, 4,760 ft. from S line and 4,800 ft. from W line of survey, F. Cordova Sur. ..... Derrick.

H. B. W. Oil Co.'s No. 2 Redwine, 150 ft. from E line and center of Payne's No. 1 Redwine, Juan Ximenes Sur. ..... Derrick.

Humble Oil & Refining Co.'s No. 5-B W. P. Moore, 330 ft. from S line and 386 ft. from E line of 61.3-ac. tract, T. J. Martin Sur. ..... Testing; T.D. 2,730 ft.

Humble Oil & Refining Co.'s No. 30-A S. A. Plowman, 330 ft. from S line and 5,830 ft. from E line of survey, F. Cordova Sur. ..... Waiting on cmt. to set 2,653 ft.

Jordan & Ramsey's No. 1 L. W. Prior, 330 ft. from N line and 407 ft. from E line of 53-ac. lease, Walker Pettit Sur. ..... Waiting for surface csg.

Kimble & Acre's No. 1 Frederick, 150 ft. from S line and center of E and W lines of 10-ac. lease, Juan Ximenes Sur. ..... Derrick

Earl and Martin's No. 2 Pinkston, 2,100 ft. from S line and 4,900 ft. from W line of survey, M. J. Pru Sur. .... Drlg. 2,788 ft.

Mid-Kansas Oil & Gas Co.'s No. 4 C. L. Graham, 150 ft. from N line and 1,104 ft. from W line of lease, Peter Tipps Sur. ..... Rig up.

Mid-Kansas Oil & Gas Co.'s No. 1 Robert Van Zandt, 1,133 ft. S and 358 ft. E of SW cor. of Stanolind-Pure, Ras Lacy 100-ac. tract, J. H. Sparks Sur. .... Derrick.

Walker Murray et al's No. 1 W. H. Arnold, 330 ft. from S and W lines of 50-ac. tract, Levi N. Sparks Sur. ..... Arranging to sidetrack; T.D. 2,735 ft.

Olson Bros.' No. 5 J. T. Brown, 200 ft. from N line and 700 ft. from W line of lease, M. J. Pru Sur. ... Derrick.

Roberts Bros.' No. 2 W. J. Brightwell, 3,480 ft. from N line and 400 ft. from W line of survey, R. E. Winn Sur. ..... Rig up.

J. L. Roberts' No. 2 Brightwell, 280 ft. from N line of survey and 150 ft. from W line, R. E. Winn Sur... Derrick.

Ross Seward's No. 1 Burton, J. J. Y'Barbo Sur. ..... T.D. 3,387 ft.

Snyder et al's No. 3 Stewart, 174 ft. NW of No. 1 and 190 ft. SE of C. L. Archer's No. 1 J. H. Stewart, John Womack Sur. ..... Derrick.

Turman Oil Co.'s No. 7 R. Dark, 330 ft. from S and W lines of lease, M. J. Pru Sur. ..... Rig up.

Weaver-Crim Oil Co.'s No. 2-B F. Bean, 700 ft. from S line and 1,500 ft. from W line of survey, Mary Cagswell Sur. ..... Drlg. 1,930 ft.

SMITH COUNTY

Kimble and Smith's No. 1 N. Green, 158 ft. from S line and 1,450 ft. from W line of survey, M. Hussner Sur. ..... Drlg. 1,730 ft.

Long Drilling Co.'s No. 3 G. A. Turner, D. W. Campbell Sur. ..... Derrick.

Mundt et al's No. 1 O. G. Funderburg, 330 ft. from NW cor. of 63-ac. tract, Victory Loupy Sur. ..... Spudding 100 ft.

The Texas Company's No. 6-B A. S. Jarvis, 660 ft. from S line and 330 ft. from W line of lease, M. D. L. S. Coy Sur. ..... Waiting on cmt. to set 3,662 ft.

TITUS COUNTY

Garland Hallett et al's No. 1 W. W. Jackson, 330 ft. from S and E lines of 20-ac. tract, J. E. Hopkins Sur. ..... Derrick.

UPSHUR COUNTY

Wadley and Evans' No. 1 W. S. Jones, 330 ft. from S and E lines of 100-ac. lease, James M. Dunn Sur. ... S.D. 3,690 ft.

VAN ZANDT COUNTY

C. P. Cole et al's No. 1 Mrs. S. Tunnell, 150 ft. from S and E lines of 64-ac. tract, M. Gross Sur. ..... Drlg. 110 ft.

Golf Oil Co.'s No. 1 Gillentine, 150 ft. from S and E lines of E 4 acres of 42-ac. tract in Nacogdoches County School Land Sur. ..... Rig up.

Golf Oil Co.'s No. 1 S. R. Stone, 150 ft. out of SW cor. of 92-ac. tract ..... Drlg. 1,225 ft.

Isaac et al's No. 1 E. T. Rhodes, 150 ft. from S and E lines of 32-ac. tract, William Page Sur. ..... Derrick.

G. S. Manning and W. H. Carlin's No. 1 Howell Bivens, 150 ft. E of the E line of Mollie High 5 acres and 150 ft. N of S line of W. H. Bunch Sur. ..... Drlg. 1,000 ft.

Petroleum Pipe Line Co.'s No. 1-A Mrs. S. McGee, 173 ft. from S line and 660 ft. from E line of Blk. No. 20, William Daniel Sur. ..... Derrick.

Pure Oil Co.'s No. 3 D. O. Mayo, 300 ft. N of S line and 225 ft. E of W line of D. O. Mayo 29.5-ac. tract, J. Prado Sur. ..... Waiting on cmt. to set.

Pure Oil Co.'s No. 5 Russell, 150 ft. from S and 792 ft. from W of 30-ac. tract in David Rose Sur. ..... Drlg. 2,334 ft.

Pure Oil Co.'s No. 6 H. P. Tunnell, 595 ft. S of N line and 225 ft. W of E line of H. P. Tunnell 131.5-ac. tract, James Rose Sur. ..... Derrick.

Pure Oil Co.'s No. 7 C. L. Swain, 250 ft. S of N line and 250 ft. W of E line of O. L. Swain, S 40-ac. tract of E 70-ac. tract, John Walling Sur. ..... Waiting on rotary tools.

Reasonover et al's No. 1 D. T. Cole, 150 ft. from S and E lines of 46-ac. tract, Nacogdoches County School Land Sur. ..... S.D. 1,220 ft.

Van Oil Association's No. 1 Tankersley, 200 ft. from E and 1,000 ft. from S of farm, L. Landers Sur. ..... T.D. 2,850 ft.; skid 50 ft. W and set 10-in. csg. at 181 ft.; waiting on cmt.

Wildcat Operations in West Texas

(Continued from Page 43)

Eppenauer Drlg. Co.'s No. 1-A Victor, 330 ft. from SW and 330 ft. from SE of NW of N half Sec. 4, Blk. 3, W.&N.W. Sur. ..... Rigging up standard tools

Goldman et al's No. 2 Allen, 330 ft. from NW, 2,310 ft. from SW, Sec. 90, Blk. 1, W.&N.W. Sur. ..... Rig.

Goldman et al's No. 1 Reagan-McElvain, 330 ft. from NE, 2,310 ft. from NW, Sec. 84, Blk. 1, W.&N.W. Sur. Cellar.

PECOS COUNTY

A. & M. Pet. Co.'s No. 1 University, 1,735 ft. from S line and 330 ft. from E line of Sec. 31, Blk. 16, University Sur. ..... Running csg. 765 ft.

Humble Oil & Ref. Co.'s No. 1 White-Baker Co., 1,320 ft. from N and E lines of Sec. 44, Blk. X, T.C.R.R. Sur. ..... Est. 2,500,000 ft. of gas from 1,702-12 ft., and saturated core; T.D. 1,712 ft.

Kimberlin et al's No. 1 B. D. Gregg, 2,488 ft. from NW and 150 ft. from NE, Sec. 101, Blk. 10, H.&G.N. Sur... S.D. 300 ft.

Wahlenmaier et al's No. 1 Monroe, 4,000 ft. W and 330 ft. N from SE cor. of Sec. 41, Blk. 1, L.&G.N. Sur. ... Drlg. 2,036 ft.

REAGAN COUNTY

Big Lake Oil Co.'s No. 8-C University, 710 ft. from S and 2,410 ft. from E, Sec. 12, Blk. 2 ..... Flowed 2,073 bbls.; T.D. 2,200 ft.

Big Lake Oil Co.'s No. 9-C University, 2,410 ft. from N and 765 ft. from E, Sec. 12, Blk. 2 ..... Drlg. 8,604 ft.

Big Lake Oil Co.'s No. 10-C University, 2,025 ft. from S and 375 ft. from W, Sec. 25, Blk. 9 ..... Drlg. 6,943 ft.

Big Lake Oil Co.'s No. 11-C University, 2,300 ft. from S line and 2,140 ft. from E line, Sec. 12, Blk. 2, University Sur. ..... Drlg. 2,801 ft.

Continental Oil Co.'s No. 7-B University, 1,900 ft. from N and 650 ft. from W, Sec. 36, Blk. 9 ..... T.D. 8,500 ft.; prepare to deepen.

Continental Oil Co.'s No. 8-B University, 1,300 ft. from S and 1,775 ft. from W, Sec. 36, Blk. 9 ..... Prepare to test; T.D. 8,556 ft.

Noel T. Lawson's No. 1 Hughes, 1,980 ft. from S line and 1,980 ft. from E line of Sec. 28, Blk. F, C.&M. Sur.... T.D. 3,021 ft.; to plug.

J. P. Williams et al's No. 1 Scott, 1,650 ft. from N and 660 ft. from W, Sec. 179, Blk. 1, T.&P. Sur. ..... Drlg. 1,600 ft.; new hole.

RUNNELS COUNTY

Dutton et al's No. 1 Dean, 5,475 ft. from NE and 1,048 ft. from NW in J. Heil Sur. No. 519 ..... S.O. 3,417-20 ft.; S.D. 3,600 ft.

John Castor's No. 1 Hall, 330 ft. from S and W, Sec. 149, E.T.R.R. Sur. ..... Spudded.

SCHLEICHER COUNTY

Eastland Oil Co.'s No. 1 Joe Tisdale, C Sec. 29, Blk. M, G.H.&S.A. Sur. ..... Fishing; T.D. 5,934 ft.

Wesner et al's No. 1 Hicks, 2,310 ft. from N and 2,302 ft. from E of Sec. 77, Blk. LL, T.C. Sur. ..... Fishing; T.D. 6,350 ft.

UPTON COUNTY

Gulf Prod. Co.'s No. 103 McElroy, 1,980 ft. from S and 660 ft. from W, Sec. 197, Blk. F, C.C.S.D.&R.G.N.G.... Drlg. 2,264 ft.

WARD COUNTY

Atlantic Oil Prod. Co.'s No. 1 University, 330 ft. S and E, Sec. 3, Blk. 16 ..... Prepare to plug; T.D. 2,720 ft.

George Bentley et al's No. 1 C. Bergman, 330 ft. from NE line and 2,310 ft. from NW lines of Sec. 36, Blk. 5, H.&T.C. Sur. ..... T.D. 2,650 ft.

George Bentley et al's No. 1 A. Emory, 1,320 ft. from NE line and 2,310 ft. from NW line of Sec. 36, Blk. 5, H.&T.C. Sur. ..... S.D. 2,301 ft.

W. A. Black et al's No. 1 Ann B. Gordon, 990 ft. from NW and 330 ft. from NE lines of Sec. 6, Blk. 34, H.&T.C. Sur. ..... Prepare to drill deeper; T.D. 2,290 ft.

Gundy et al's No. 1 Bennett, 2,310 ft. from NW and SW Sec. 16, Blk. 34, H.&T.C. Sur. ..... Swabbing and cleaning out; T.D. 2,632 ft.

Eppenauer Drlg. Co.'s No. 1 G. S. Comos, 498 ft. from N line and 428 ft. from NW line of Sec. 4, J. W. Hollingsworth Sur. ..... Rig up.

Eppenauer Drlg. Co.'s No. 1 University, 330 ft. from N and 440 ft. from E of S half of Blk. 18 ..... Derrick.

Gerber O. & G. Co.'s No. 1 Stubbs, 330 ft. from S, 990 ft. from W, Sec. 9, Blk. 3, B.&B. Sur. ..... Cellar.

Graham Corp.'s No. 1 Bennett, 2,310 ft. from NE line and 330 ft. from SE line of Sec. 16, Blk. 34, H.&T.C. Sur. ..... S.D. 2,460 ft.

Gulf Prod. Co.'s No. 16 Hutchings, 1,932 ft. from S and 1,650 ft. from W, Sec. 5, Blk. F ..... Swabbing and cleaning out; T.D. 2,754 ft.

Gulf Prod. Co.'s No. 17 Hutchings, 330 ft. from W line and 1,151 ft. from S line of Sec. 5, Blk. A, G.&M.M.B.&A. Sur. ..... Fishing 2,660 ft.

Gulf Prod. Co.'s No. 30 O'Brien, 990 ft. from S line and 660 ft. from W line of Sec. 6, Blk. F, G.&M.M.B.&A. Sur. ..... Prepare to test.

Humble Oil & Ref. Co.'s No. 1 Louis Richter et al, 1,650 ft. from the NE line and 990 ft. from SE line of Sec. 27, H.&T.C. Sur., Blk. 34 ..... Drlg. 2,397 ft.

Skelly Oil Co.'s No. 2 Brillhart, 1,320 ft. from SE line of Sec. 13, Blk. 34, H.&T.C. Sur. ..... Drlg. 2,510 ft.

Sturm-Simms' No. 4 Jones, 2,310 ft. from NE line and 1,650 ft. from S line of Sec. 25, Blk. B-29, P.S.L. Sur... Running csg. 2,435 ft.

Wahlenmaier Pet. Corp.'s No. 1 Bergman, 2,310 ft. from NE line and 1,650 ft. from SE line of Sec. 26, H.&T.C. Sur. ..... Fishing 1,380 ft.

WINKLER COUNTY

Colonial Oil Co.'s No. 1 State vacancy, 330 ft. E and 103 ft. N of NW cor. Sec. 2, Blk. 77, P.S.L. Sur. ..... S.D. 3,147 ft.

Sid Richardson's No. 1 State-Scarborough, 1,320 ft. E and 1023½ ft. N of the NW cor. of Sec. 1, School Blk. 77, located in Sur. No. 1, Blk. WF ..... Fishing for tools; T.D. 2,933 ft.

Wildcat Operations in Texas Panhandle

Week Ending May 22

CARSON COUNTY

Company, well, farm name, section and block—	Remarks
The Texas Co.'s No. 2-B Garner, 990 ft. N and E, Sec. 95, Blk. 4, L.&G.N. Sur.	Drlg. 2,675 ft.

CHILDRESS COUNTY

G. V. McClintock et al's No. 1 B. F. Moore, C Sec. 47, F. P. Knott Sur.	S.D. 820 ft.

COLLINGSWORTH COUNTY

Tittle, Cochran et al's No. 1 Boyles, 150 ft. S and E of Sec. 96, Blk. 14, H.&G.N. Sur.	S.D. 162 ft.

GRAY COUNTY

British American Oil Co.'s No. 3 Phillips, 330 ft. from S and W lines of W½ of E½ of Section 27, Block No. 3 I.&G.N. Survey	Derrick.
R. Dunlop's No. 1 Priest, 990 ft. S and 330 ft. W Sec. 14, Blk. S, J. C. Short Survey	Drlg. 500 ft.
Gulf Production Co.'s No. 3-A Catlin, 330 ft. from S and W lines of Gulf lease in NE of Section 57, Block 3 I.&G.N. Survey	Cemented casing 646 ft.
Hendron et al's No. 1 Husselby, 330 ft. S and E of SW SW Sec. 11, Blk. A-9, H.&G.N. Sur.	Rig.
Magda-Shell's No. 4 Coombs-Worley, 990 ft. from N line 330 ft. from E line, Sec. 35, Blk. 3, I.&G.N. Sur...	Rig.
North American O. & G. Co.'s No. 1 Sullivan (old well drilled deeper) center of SE of Section 160, Block 3 I.&G.N. Survey	Drlg. 2,660 ft.
Ochiltree et al's No. 1 Hughey, 660 ft. S, 330 ft. E W half SE, Sec. 139, Blk. 3, I.&G.N. Sur.	T.D. 3,257 ft; T.P. 3,170 ft; shot with 100 qts. from 3,170-3,240 ft.
Phillips Petroleum Co.'s No. 2 Palmer, 990 ft. from S and 330 ft. from E line of Section 31, Block B-2 H.&G.N. Survey, Old well drilled deeper	T.D. 2,962 ft.
Skelly Oil Co.'s No. 1 C. Thut, 330 ft. from S line, 330 ft. from W line, SW Sec. 1, H.&G.N. Sur., Blk. 1....	S.D. 2,399 ft.
Tedesco-Bell O. & G. Co.'s No. 4 Morse, 990 ft. N and W SE, Sec. 1, Blk. 36, H.&G.N. Sur.	Cleaning out, T.D. 2,542 ft.
The Texas Co.'s No. 4 Brown, 330 ft. N, 990 ft. W of W½ Sec. 137, Blk. 3, I.&G.N. Sur.	Rig up to drill in, T.D. 2,065 ft.
The Texas Co.'s No. 2 Faulkner, Section 29, Block 2-B H.&G.N. Survey, old well being drilled deeper	T.D. 2,935 ft.
Geo. Travis' No. 3-B Webb, 990 ft. N and W, Sec. 61, Blk. 36, H.&G.N. Sur.	T.D. 565 ft.
Warner Oil Co.'s No. 1 Webb, 660 ft. from S and W of W 80 of N½ Sec. 42, Blk. 35	Estimated 7,000,000 ft. of gas; T.D. 2,175 ft.
Wilcox O. & G. Co.'s No. 22 Combs-Worley, 330 ft. N and E, W½ Sec. 35, Blk. 3, I.&G.N. Sur.	Rig up standard tools, T. D. 2,953 ft.

HUTCHINSON COUNTY

Alexander's No. 1 Cockrell, 330 ft. N and E of E 80 of S 160, Sec. 3, Blk. M-2, T.C. Sur.	T.D. 3,039 ft; to shoot.
Badger Oil Co.'s No. 5 Lewis, 2,278 ft. from S, 330 ft. from W, Sec. 12, Blk. L, E.L.&R.R. Sur.	Drlg. 900 ft.
Dixon Creek Oil Co.'s No. 1 Haile, 660 ft. east of Alexander's No. 1 Cockrell, Sec. 4, Blk. M-21, T.C.R.R.	Rig up.
W. E. Means et al's No. 1 Pond, 330 ft. S and E, N½ of E 165½ acres, Sec. 2, Blk. M-21, T.C.R.R. Sur.	Drlg. 300 ft.
H. Stekol's No. 4-D G. A. Whittenburg, 450 ft. from N line, 990 ft. from W line, Sec. 38, Blk. M-33, T.C. R.R. Sur.	Rig up.
Texilvania Oil Co.'s No. 1 Haile, 330 ft. S, 330 ft. W, Sec. 16, Blk. 1, E.L.R.R. Sur.	T.D. 3,034 ft., shot 120 quarts at 2,970-3,017 ft., estimated 40 bbl. well.

RANDALL COUNTY

Woolsey & Devore's No. 1 Below, 330 ft. N and 1320 ft. E of NE, Sec. 85, Blk. 2, A.B.&M. Sur.	Rig up.

ROBERTS COUNTY

Chicken Creek Oil Co.'s No. 1 Ledrick, 330 ft. N and W, Sec. 55, Blk. C, G.&M. Sur.	Recmtng. csg.; T.D. 4,934 ft.

WHEELER COUNTY

Bell O. & G. Co.'s No. 1 Evans, 330 ft. N and E of NW Sec. 51, Blk. 24, H.&G.N. Sur.	Repairing bailer, T.D. 1,520 ft.
Delaney et al's No. 1 Sitter, 330 ft. from S and W of E half NE, Sec. 33, Blk. 24	Est. 15,000,000 ft. gas; S.D. 3,711 ft.
Helena O. & G. Co. et al's No. 1 Below, C NE SW, Sec. 50	Drlg. 2,286 ft.
Rogers & Harner's No. 1 J. O. Clark, 990 ft. S and W of Sec. 4, Blk. 24, H.&G.N. Sur	Rig.
The Texas Co.'s No. 2 Bentley, 330 ft. N and W of W½ of SW¼, Sec. 42, Blk. 24, H.&G.N. Survey....	Drlg. 185 ft.

Announcing

COUBROUGH PROCESS

(U. S. Patent No. 1,905,156)
Other patents allowed and pending

for the simultaneous recovery of heaviest lube stocks and low penetration asphalt from the residuum of all types of asphaltic and mixed base crudes

another step toward Lower Costs

Maximum yield of heavy lube stock and low penetration asphalt from asphaltic bottoms

THE conventional practice of distilling crude oil in two stage atmospheric-vacuum units does not provide economical or satisfactory recovery of the higher boiling lube stocks. The Coubrough Process, perfected by The Lummus Company, now offers to the industry means for effecting the separation of high viscosity lube stocks from asphaltic bottoms by simple distillation at low temperatures.

In principle the Coubrough Process consists in flashing a blended residuum of definite composition. The optimum blend is obtained by the addition of non-vaporizable material and a light oil or "carrier" to a residuum containing heavy lube stocks and asphalt.

The Coubrough Process is applicable to any residuum and can be controlled to give any desired separation of heavy lube distillates and asphalts. Temperatures employed are much lower than those used in other processes; possible cracking of lube stock due to overheating is eliminated. Suitable distillate for the carrier is available in any refinery—and easily separated.

Refinery Executives will find it to their interest to secure further detailed information on the Coubrough Process and its application to their operations.

THE LUMMUS COMPANY, 50 Church Street, New York City

LUMMUS

PETROLEUM REFINING PLANTS

Many Factors Considered in Reforming Naphtha to Improve Octane Number of Motor Fuels

By E. J. LEROI and H. W. FERGUSON
Humble Oil & Refining Co.*

The straightrun charge stocks used in the experimental work represents a mixture of cuts from Panhandle, Reagan, Salt Flat, Coastal, Northeast Texas and Humble—West Texas crudes. The cracked stock was obtained by distillation of a heavy naphtha withdrawn from units cracking a mixed heavy gas oil derived from the above crudes. The characteristics of average samples of the charge stocks are indicated in Table 1.

TABLE 1—AVERAGE INSPECTIONS OF CHARGE STOCKS

Distillation range in °F.:	Straightrun heavy naphtha	Cracked heavy naphtha
Gravity, °A.P.I.	51.0	45.0
Initial boiling point	230	260
Endpoint	415	415
Percentage at 400	96.0	97.0
10 per cent point	275	310
50 per cent point	315	340
90 per cent point	370	375
Aniline point, °F.	132	112
Octane No.	31	52

Since the experimental work was spread over such long periods of time,

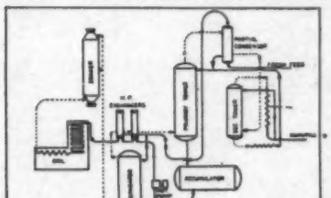


Figure 1—Recycle flow

complete analyses of the feed stocks were procured whenever possible in order to eliminate data on widely different heavy naphthas. The straightrun naphthas processed in the first recycle runs were a broader cut stock than those charged in the later recycle and once-through runs. Only a slight variation in aniline point was observed on this stock (132° to 138° F.) in all runs made. The octane numbers ranged from 30 to 32 in most tests, with the exception of the last five coil-only runs, which showed 30 to 38 octane number feed stocks. The cracked heavy naphthas were of uniform composition in all test runs. The octane number determinations on both charge stocks were obtained by direct comparison with iso-octane and normal heptane mixtures. These octane numbers were procured on a Series 30 engine.

Eight series of runs were made—five on the straightrun stock and three on the cracked heavy naphtha, with operating conditions as indicated in Table 2:

Table 2—Types of Operation

1. Recycling straightrun heavy naphtha with coil and soaker at 940° F. coil-outlet temperature.

2. Recycling cracked heavy naphtha with coil and soaker at 924° to 930° F. coil-outlet temperature.

3. Recycling straightrun heavy naphtha with coil and soaker at 940° to 970° F. coil-outlet temperature.

4. Once-through on straightrun heavy naphtha with coil and soaker at 917° to 995° F. coil-outlet temperature.

5. Once-through on cracked heavy naphtha with coil and soaker at 945° F. coil-outlet temperature.

6. Once-through on straightrun heavy naphtha, with coil only, at 980° to 1,020° F. coil-outlet temperature.

7. Once-through on cracked heavy naphtha with coil only, at 995° to 1,025° F. coil-outlet temperature.

8. Once-through on straightrun heavy naphtha, with coil only, at 1,020° F. coil-outlet temperature and reduced pressure.

*Semiannual meeting, A.P.I., May 19, 1933.

In Series 1 and 2 the octane number improvement was obtained by undercutting the endpoint of the cracked distillate. The improvement was obtained in the other series by adjustment of coil-outlet temperature and/or feed rate. All operations were at 800-pound pressure except in Series 8 in which the pressure was at 250 pounds per square inch.

The description of the equipment can be accomplished to the best advantage with the aid of flow diagrams. The units used in the experimental work were of the tube-and-tank type, equipped with a furnace capable of a heat input of the oil of 28,000,000 B.t.u. per hour.

Figure 1 shows the flow in a normal recycle operation in which the fresh feed is preheated in a partial vapor condenser and pumped to the accumulator, where the cycle oil from the primary tower joins it to make up the total feed stream. Hot pumps force the total feed through high-pressure exchangers, the coil, and the up-flow soaker (operating at 800 pounds per square inch). Pressure is released at the soaker outlet, and the cracked stock flashes in the separator—where tar is removed from the bottom. The overhead vapors pass through the high-pressure exchangers and fractionating equipment. Naphtha of the desired endpoint is partially condensed in a vapor to feed exchanger, and passes through the final cooler to the receiving drum.

The once-through operation in Figure 2 differs from the first hookup in that no cycle fractions join the feed to the coil. A small stream of cycle oil from the bottom of the primary tower is withdrawn, cooled, and fluxed to the soaker outlet—which is equipped with a coke

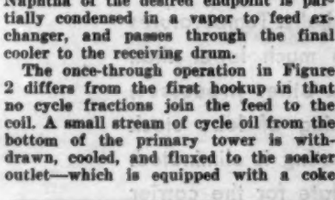


Figure 2—Once-through flow

drill. The drilling and cooling action at the point of release is essential to satisfactory operation at the higher temperatures. No attempt is made to fractionate the distillate. In both operations tar flux is admitted to the separator to control gravity.

The relationship between total distillate yield and octane number for the recycling and once-through operations on both straightrun and cracked naphthas is shown graphically in Figure 3. In determining the yields, all liquid quantities were obtained from tank gauges, and gas figures from meter readings. A butane recovery of 80 per cent was used in calculating the casinghead content of the wet gases.

In order to discuss the yield relationships between operations on a comparable basis, all distillate quantities were corrected to a 400° F. naphtha in all cases where the endpoint exceeded 400° F. A yield of 60 per cent was assumed on recracking the Diesel fraction. Table 3 gives a clear picture of the degradation of the original charge stock to gas and tar for the several types of operation.

The data in Table 3 show clearly the decrease in degradation obtained by the once-through operation and the recycle operation to 400° F. endpoint naphtha

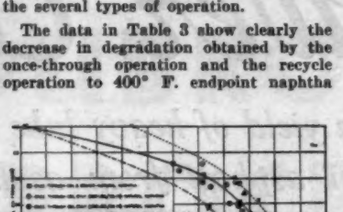


Figure 3—Heavy naphtha cracking yield octane number relationship. Total distillate

as compared to the recycle operation in which octane number improvement was obtained by undercutting endpoint. The degradation per point of octane number improvement in Series 3 and 4 is about the same in the range investigated. The once-through operation is more feasible in a case where a 420° F. endpoint finished gasoline is required, since the quantity between 420° F. and the endpoint is but 2 per cent to 4 per cent, and furnishes an excellent rerun bottom.

The coil-only once-through runs were made to determine whether or not the decreased time at higher temperatures would lessen degradation. The effect of pressure on cracking conditions was also investigated. Table 4 gives the comparison. The degradation per point of octane number improvement is about the same in the coil-only runs at 800 pounds as was realized with the coil and soaker. Operation at 250 pounds showed a definite tendency toward increased degradation. This point has also been observed in research work by other companies.

TABLE 3—STRAIGHTRUN HEAVY NAPHTHA

Octane No. range—	Per cent degradation per point of octane number improvement: Series 1 (recycle at 940°F.)	Series 3 (recycle at 940° to 970° F.)	Series 4 (Once through at 917° to 995° F.)
31 to 60	0.39	0.39	0.30
60 to 65	0.56	0.44	0.42
65 to 70	0.98	0.70	0.68
70 to 75	1.38	0.90	0.90
75 to 80	*1.61	....	1.12
80 to 85	....	....	1.28

*Based on 75.0 to 78.6 octane number range.

TABLE 4—COMPARISON OF DEGRADATION FOR COIL-ONLY AND COIL-SOAKER OPERATION ON STRAIGHTRUN HEAVY NAPHTHA

Coil-only straightrun naphtha: Octane No. range—	Per cent degradation per octane number improvement	Coil and Soaker straightrun naphtha: Octane number range	Per cent degradation per octane number improvement
31.0 to 72.0 (800 lb.)	0.32	31.0 to 73.0	0.40
36.0 to 70.5 (800 lb.)	0.40	31.0 to 65.5	0.32
38.2 to 65.8 (800 lb.)	0.29	31.0 to 58.6	0.30
37.7 to 72.5 (800 lb.)	0.43	31.0 to 66.8	0.34
36.0 to 66.8 (250 lb.)	0.44	31.0 to 60.8	0.31
36.6 to 72.8 (250 lb.)	0.43	31.0 to 67.2	0.35

A comparison is made in Table 5 between the cracked and straightrun heavy naphthas on the basis of the same overall octane number improvement. In the range indicated straightrun-naphtha cracking results in a much lower degradation loss. However, for the range of 75 to 80 octane number, in the once through runs, the degradation for both types of heavy naphtha is about the same. A compensating factor for the higher degradation realized in the cracking of cracked naphthas, as compared to cracking straightrun naphtha, lies in the fact that no additional treating costs are incurred in the former procedure, as the cracked naphtha has to be treated in any event.

So far in the discussion comparisons between operations have been based principally upon degradation. Unit capacity and product quality should also be considered.

Table 6 points out the capacity advantage of the once-through coil and soaker flows at 800 pounds pressure over the other types of operation on straightrun stock. Of the two coil-only flows, the high pressure operation is considerably better from the standpoint of feed rate. The recycle operations are all lower in capacity. The same observations hold true for the cracked stocks. The foregoing conclusions are based on the use of existing equipment for naphtha-reforming service. In the design of new equipment, a coil-only high-pressure flow would more than likely be more feasible, since it

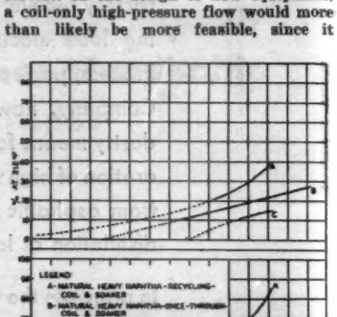

LEGEND
A- NATURAL HEAVY NAPHTHA-RECYCLING-COIL & SOAKER
B- NATURAL HEAVY NAPHTHA-ONCE-THROUGH-COIL & SOAKER
C- CRACKED HEAVY NAPHTHA-ONCE-THROUGH-COIL ONLY.
OCTANE NUMBER - TOTAL DISTILLATE

Figure 4—Heavy naphtha cracking change in volatility of total distillate with increased octane number.

eliminates the expense of a soaker installation.

The characteristics of the total distillates produced in the several types of operation are presented graphically in Figure 4.

The fills of the total naphtha at 212° F. and 284° F. are given for the once-through coil and soaker operation on straightrun heavy naphtha at 800 pounds, the recycle undercutting operation on straightrun naphtha, and once-through coil-only flow on cracked heavy naphtha at 800 pounds pressure. The coil-only data on the natural stock and the coil and soaker data on the cracked naphtha operation were in close agreement with the aforementioned results; and, therefore, are not included. The recycling operation in which octane number was obtained by undercutting endpoint resulted

(Continued on Page 83)

Laboratory Control of Making Paraffin Distillate Simplifies Dewaxing Problem in Refinery

By L. L. DAVIS and D. S. CAMPBELL
Continental Oil Co.*

During the past few years there have been considerable crystallographic data on paraffin wax made available to the petroleum refiner. These data have resulted in the development of accurate laboratory methods for the control of the quality of wax distillate or "pressing stock." The purpose of this paper is to describe the control methods used by the Continental Oil Co., and to discuss briefly the factors determining a satisfactory pressing stock.

The complete laboratory control of pressing stock should include: (1) Viscosity, for the determination of filtering rates; (2) distillation, for the determination of yield of raw neutral oils; (3) quantity of wax; and (4) crystal structure of the wax, to determine the ease of pressing and sweating.

Viscosity

The filtering rate, i.e., the rate at which the oil content of the pressing stock can be forced through the wax cake and press blanket, is determined by the viscosity of the wax-free oil at the temperature of pressing—by the quantity of wax in the distillate, and by the character of the wax cake. Table 1 gives the relationship between pressing temperature, viscosity of the pressing stock, and filtering rate as reported by a number of representative Mid-Continent refineries. This shows the possible wide variation in actual wax-press capacity obtained due to variations in viscosity and quality of the pressing stock. The optimum viscosity of pressing stock for maximum production of finished wax and lubricating oil for any given plant must be determined by trial and error. The best viscosity having been found, the plant control simply consists of the usual viscosity determination of stream and tank samples.

Distillation

As the quality of the pressing stock—and particularly the yield of lubricating oil therefrom—is determined by the fractionation of the distillate from the crude oil, the distillation range of the pressing stock represents the most important control test. We have found that a distillation made under 40 m.m. absolute pressure is very satisfactory for control purposes. At this pressure the relative pressure variation is so small that the results are dependable and the pressure is sufficiently low to reach the endpoint of the distillate without cracking.

The equipment used is the Bureau of Mines vacuum-distillation apparatus, using a charge of 200 c.c. of oil. A Cenco automatic vacuum controller and HiVac pump are used for pressure control, and an ammeter and rheostat are used for heat control. By thus accurately controlling the distillation pressure and heat input, reproducible results are easily obtained.

Routine control operations include a distillation on every run tank of pressing stock before transfer to the wax plant, and such tests as are necessary on stream samples to keep the crude distillation uniform.

The distillation range is the true measure of the yield of viscous oil from the dewaxed distillate. Thus various pressing stocks having viscosities of approximately 70 seconds at 100° F. were reported as giving yields of from 33 to 51 per cent of raw 200-viscosity neutral stock, the yield depending upon the breadth of the cut. Table 2 gives the distillation at 40 m.m. pressure for several typical pressing stocks from Mid-Continent refineries.

In addition to the yield of neutral oil, the distillation range of a pressing stock for a given degree of fractionation determines the crystal structure of the distillate, and will be discussed in more detail.

As a rule, no control work need be done with respect to the yield of wax from a pressing stock; since with a given crude and distillation process this factor will be sufficiently uniform. However, in case of new crudes or the selection of crude tanks containing settled wax from long storage, it is occasionally necessary to determine the wax content of either a commercial pressing stock or of the wax fractions from a laboratory true-boiling-point column distillation.

A satisfactory procedure consists of chilling a mixture of 50 per cent wax distillate and 50 per cent stabilized natural gasoline (Reid vapor pressure at 14 to 16 pounds) in a cold room. Cooling over a 24-hour period is desirable to permit large-crystal growth, and the mixture is then filtered by vacuum through paper on a Buchner funnel. The wax cake is carefully washed with cold natural gasoline. With a cold room at —18° F. the resultant oil will have a pour test of from 0° to 10° F. and; if the wax crystal structure was reasonably good, the wax cake will have an oil and moisture content of less than 1 per cent. Table 2 includes the wax content and melting point of representative distillates as determined by this method.

TABLE 1—PRESSING CHARACTERISTICS OF VARIOUS COMMERCIAL WAX-PLANT CHARGING STOCKS

Operation No.	Pressing temperature (° F.)	Viscosity at 100° F. Pressing stock (seconds)	Viscosity at 100° F. Dewaxed oil (seconds)	Approximate viscosity at pressing temperature (seconds)	Pressing rate (barrels per 48-in. plate per day)
1	+15	100	114	1,500	0.45
2	+ 5	75	82	1,200	0.35
3	— 5	66	69	1,400	0.30
4	— 5	66	68	1,380	0.40
5	— 6	68	74	1,800	0.37
6	— 8	70	76	2,100	0.43
7	—10	58	63	1,350	0.41
8	—18	55	57	1,400	0.43

TABLE 2—PHYSICAL CHARACTERISTICS OF VARIOUS COMMERCIAL WAX DISTILLATES

Pressing stock number—	1	2	3	4	5	6
Gravity, °A.P.I.	34.2	32.0	31.0	31.4	31.7	31.6
Flashpoint, °F.	90	170	360	280	320	315
Viscosity at 100° F.	63	70	94	66	68	75
Cold test (solid point) °F.	66	68	74	42	56	60
Distillation range at 40 m.m. in °F.:						
Initial boiling point	...	256	450	256	312	306
10 per cent point	344	312	476	395	394	416
20 per cent point	466	350	493	416	426	445
30 per cent point	494	473	509	436	453	469
40 per cent point	511	498	525	461	479	491
50 per cent point	527	518	541	490	503	513
60 per cent point	544	539	557	524	523	533
70 per cent point	564	561	573	557	543	554
80 per cent point	588	585	593	590	562	580
90 per cent point	622	611	615	625	590	616
Endpoint	648	632	607	643	625	652
Wax content, per cent	8.75	6 75	7 66	1.58	5.77	4 8
Melting point of wax, °F.	118	123	123+	119	124	123
Per cent raw 200-visc. neutral from pressed distillate	50	48	50	51	33	39 0
Corresponding operation No., Table 1	8	6	7	4	5	2 and 3

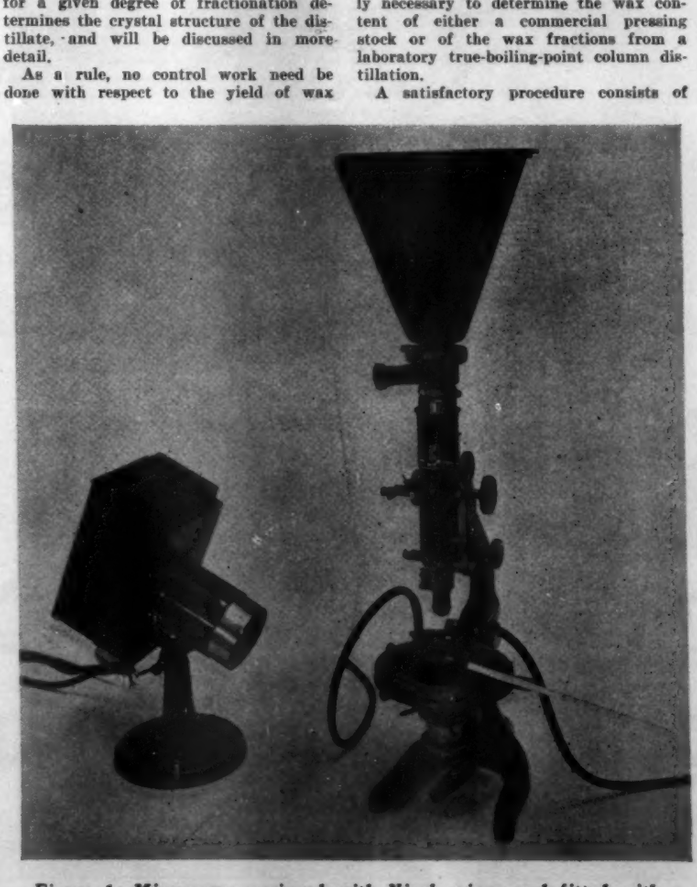


Figure 1—Microscope equipped with Nicol prisms and fitted with a camera. To the left is a low voltage lamp

Wax Crystal Structure

The final and most interesting, if not most important, control test on pressing stock is the microphotographic study of the wax crystal structure of the distillate.

Only such literature references will be summarized which bear more or less directly upon the practical control of pressing stock. Those interested in the historical and theoretical considerations of the subject are referred to the very complete bibliographies which may be found in the articles referred to in this paper.

In 1926, Padgett, Hefley, and Henriksen[1] reported our first work on the crystal structure of petroleum waxes, which was carried out at the University of Oklahoma under a research fellowship sponsored by our company. They reported three specific types of wax crystals: (1) The very small crystals, characteristic of petrolatums which, when sufficiently free of crystal inhibitors such as asphaltic materials, show a distinct plate structure, but which do not grow into large crystals; (2) the characteristic needle-like crystals formed from high concentrations of paraffin wax such as slack wax, scale wax, etc.; and (3) the large plate crystals formed in dilute solutions such as "cracked wax distillate" or pressing stock. They also discussed the effect of viscosity of the solvent oil and the presence of colloidal material on crystal growth.

Buchler and Graves[3] conclude that the petroleum waxes belong to the homologous series of C_nH_{2n+2}, and are straight-chain hydrocarbons. The crystallization behavior of the petroleum waxes depends upon the presence of "soft waxes," the presence of which in small quantities causes needle formation and in large quantities causes the formation of the small crystals, characteristic of petrolatum.

Ferris, Cowles, and Henderson[3,4] from a very exhaustive fractionation of the waxes occurring in slack wax conclude that the petroleum waxes contain a number of homologous series, the members of each series crystallizing in similar forms. These series may be divided into three classes, depending upon their crystal form, i.e.: (1) Plates; (2) needles; and (3) "mal-crystalline," i.e., having no distinct form. In mixtures the needles and mal-crystalline classes will impress their forms upon the plates if they are present in sufficient concentration to separate from the solution at the temperature at which the plate crystals are forming. The needle and mal-crystalline forms appear more soluble than the plate forms; and, therefore, in dilute solutions of mixtures the plates will predominate, while in concentrated solutions the other forms will mask or impress their forms on the plates.

Clark and Smith[5] have made an X-ray

*Paper presented at third midyear meeting, American Petroleum Institute, Tulsa, May 18, 1933.

diffraction study of the wax fractions prepared by Ferris, Cowles and Henderson, and conclude that paraffin waxes from all sources are composed of normal and iso-paraffin molecules. Mid-Continent wax would appear to contain about 65 per cent normal paraffins and about at least 20 per cent of iso-paraffinic material.

Reference Work

After an extensive study of fractionated commercial paraffin wax, Katz[6, 7] arrives at the conclusion that the true crystal form of these waxes is the plate, and that needles are abnormal crystallographic forms. Needles are formed only when the concentration of the wax in the solvent is sufficiently great that the saturation temperature is above a definite "temperature of change." If the concentration is less than the "concentration of change," the crystals will be plates.

The majority of the crystallographic studies of petroleum waxes have been made on commercial finished waxes rather than upon the unfinished refinery distillates. Regardless of theoretical considerations, the available knowledge on the subject does permit of accurate practical laboratory control of the quality of paraffin pressing stock.

In order for a wax-containing distillate to press satisfactorily and the slack wax therefrom to sweat efficiently, the wax crystals in the pressing stock must be large, clean-cut plates; and the slack wax must show large, clean-cut needle crystals. In neither case should the mal-crystalline structure described by Ferris and others be present to an appreciable degree.

The procedure for the microphotographic control testing of pressing stock is that described by Padgett and others[1]; however, in order to get accurate reproducible results, the detail technique developed by the research department of the Tide Water Oil Co. has proved very satisfactory.

The apparatus is shown in Figure 1. A Leitz microscope equipped with Nicol prisms is fitted with a Leitz "Makam" camera. The source of illumination is a 108-watt 6-volt lamp powered through a step-down transformer from the regular 110-volt lighting circuit. The water-jacketed hot stage is fitted with a hanging-drop microscope slide having a 3 mm. depression. A thermometer is inserted in in the air space of the stage above the slide, and a strip of celluloid containing a hole for the objective lens covers the stage. The water jacket is connected to the cold and hot water supply through needle valves. Thermometers in the inlet and outlet water permit accurate control of the temperature differential across the stage and, therefore, of the rate of cooling.

The procedure in studying an unknown sample is to place a single drop of the sample, which has been filtered through paper to remove moisture, in the depression of the microscope slide. The drop is distributed over the depression by tilting the slide. The microscope is adjusted so that the sample is between crossed nicols, and is focused on the sample. Cold water is passed through the jacketed stage until the first crystals appear. The temperature at this point is recorded as the "saturation temperature," and hot water is then passed through until a temperature 40° F. above the saturation temperature is reached in the stage. Cool water is then passed through the stage so that the stage temperature decreases at a rate of 1.7° F. per minute. The cooling is continued until a temperature of 10° F. below the saturation temperature is reached. This should take exactly 30 minutes, as a uniform cooling rate is essential for reproducible results. The microscope is then accurately focused, and the plate in the camera exposed.

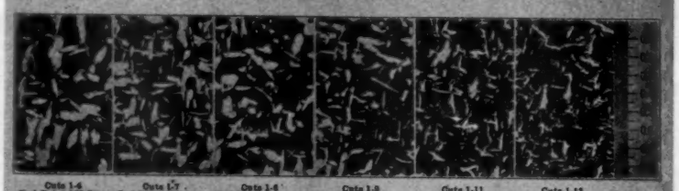
In routine control work, where the characteristics of the distillate are known, the preliminary cooling may be dispensed with. The filtered sample is placed in the stage at a temperature of 40° F. to 50° F. above the saturation temperature, and is then cooled at the standard rate. Observations are made until the saturation temperature is reached, and the cooling continued 10° F. below that point. For control purposes the actual photographing of the crystals may be dispensed with. The crystal structure is observed visually and referred to a standard series of crystal microphotographs, and reported by number. By this method the quality of the pressing stock may be reported to the operating department within 45 minutes to 60 minutes after the sample has been delivered to the laboratory.

TABLE 3

Cut No.	Per cent of crude at cut point	Temp. at cut point, 3 mm. pressure (°F.)	Gravity A.P.I.	Viscosity at 100° F.	Cold test (solid point) (°F.)	Per cent of wax by weight	Melting point of wax (°F.)	Vis. of dewaxed oil at 100°F.
1	58.2	358	35.2	48	3	0	0	40
2	60.4	377	32.7	51	25	7.2	96	64
3	62.6	402	31.5	56	53	9.1	105	64
4	64.8	420	30.6	75	58	9.3	112	89
5	67.0	442	29.8	89	66	7.4	124	112
6	69.2	460	28.8	115	76	10.8	128	152
7	71.4	478	28.6	152	85	10.1	132	188
8	73.6	499	28.4	200	89	9.7	137	234
9	75.8	520	28.2	258	95	9.2	142	310
10	78.0	541	27.7	320	98	8.7	145	387
11	80.2	567	26.9	400	102	9.5	145	431
12	82.4	598	26.1	480	105	6.8	145	523
13	84.6	625	25.6	470	108	5.2	149	495

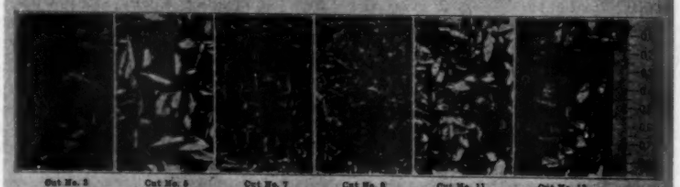
Wax Crystals from Individual Fractions. Cut Temperatures in Deg. F. at 3 MM. Absolute Pressure.

FIG. 2



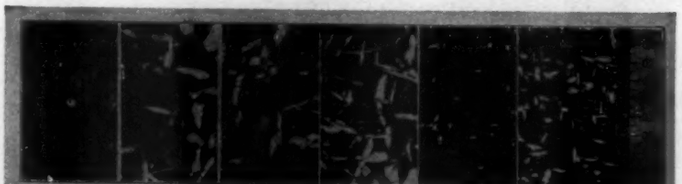
Wax Crystals from Consolidated Cuts. End Point of Each Group in Deg. F. at 40 MM. Absolute Pressure.

FIG. 3



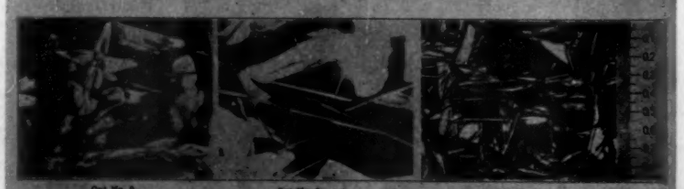
Sixty Per Cent of Individual Wax Fractions in 40 Per Cent of 75-Viscosity Pressed Distillate.

FIG. 4



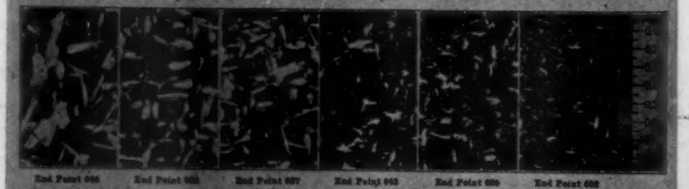
Fifteen Per Cent of Individual Wax Fractions in 85 Per Cent of 75-Viscosity Pressed Distillate.

FIG. 5



Crystal Growth from Oil-free Wax

FIG. 6



Characteristic Commercial Paraffin Distillates. End Points in Deg. F. Under 40 MM. Absolute Pressure.

FIG. 7

Microphotographs of wax crystals by varying temperature

Experimental Results

In order to show the effect of the distillation range of a pressing stock on the wax crystal structure, a sample of Oklahoma crude was topped to remove all light oils up to the normal pressing-stock fraction. An assay distillation[3] of the topped crude was then made under 3 mm. absolute pressure, cuts being made every 2.2 per cent on the original crude. The individual fractions were dewaxed as outlined above. Table 3 gives the physical characteristics of the fractions, the last one (No. 13) being the only one which showed evidence of cracking during distillation. The "cut per cent" and "cut temperature" represent the conditions under which each fraction was cut. Microphotographs of the various fractions were made. Figures 2 to 7 include a microphotograph of a millimeter scale, the smallest subdivision being 0.01 mm., by which the crystal size may be measured.

Figure 2 shows the crystal structure of each alternate fraction crystallized from its own oil fraction. The first cut showed no crystals, while the second cut showed very few; the series is, therefore, started with the third cut. Up to the sixth cut the crystals were clean-cut plates. The seventh cut showed evidences of mal-crystal formations, which was true up to the thirteenth, which showed cleaner-cut crystals, probably due to the cracking during the distillation of that fraction.

Figure 3 shows the crystal structure resulting from the consolidation of the fractions. Fractions 1 to 6 are the first group. Table 4 gives the characteristics of these consolidated cuts. The crystal structure shows a uniform diminution in size of the plate crystals through the 1 to 11 series. The 1 to 12 and 1 to 13 cuts show distinct mal-crystalline forms.

TABLE 4—PHYSICAL CHARACTERISTICS OF CONSOLIDATED FRACTIONS

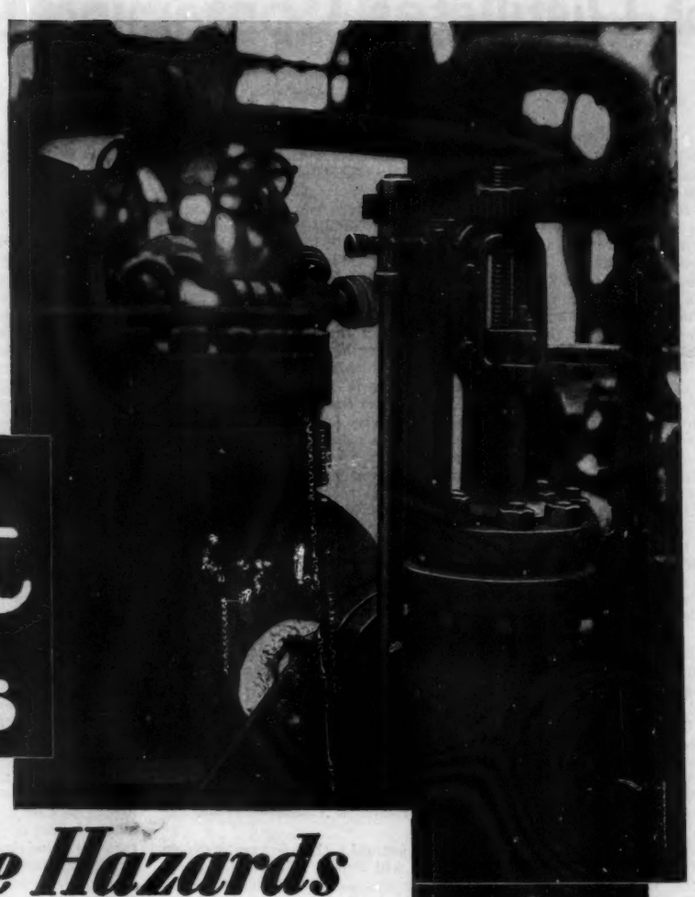
Combined cuts	Per cent of crude	Distillation endpoint under 40 mm. pressure (°F.)	Viscosity at 100° F.
1 to 6	13.2	572	62
1 to 7	15.4	590	67
1 to 8	17.6	608	71
1 to 9	19.8	618	81
1 to 10 ...	22.0	637	90
1 to 11 ...	24.2	652	100
1 to 12 ...	26.4	676	111
1 to 13 ...	28.6	702	125

As the solvent oil was different in each of the series of microphotographs given in Figures 2 and 3, the oil-free (9+ per cent) wax from each fraction was redissolved in a 75-viscosity-at100°-F. wax-free pressed distillate (—10° F. cold test). Figure 4 gives the resulting crystal structure of each wax fraction in a 60 per cent—40 per cent—oil solution. Cuts 3 to 5 showed that distinct plates form, while cuts 6 to 10 showed needle structure; and 11 to 13 showed a malformed plate structure. Figure 5 gives the same series in 15 per cent wax—85 per cent oil solution. All fractions show the plate structure—the eleventh, twelfth and thirteenth showing the mal-crystalline form.

In order to study the effect of solution concentration of the lower melting point waxes on crystal structure, the wax from Fractions 2, 3, 4 and 5 were examined in the oil-free condition. Figure 6 gives the results for cuts 2, 3 and 5. Fraction 2 showed very rapid growth of large plates. The wax from Fraction 3 is exceptionally interesting. Very large clean plates were formed, some more than 0.5 mm. long. The solid wax itself showed a leaf-like structure to the eye, being actually foliated or micaceous in structure. Cut 4 showed smaller plates with a few needles. The fifth cut shows very distinct needle structure growing from plates.

It, therefore, appears that the wax fractions from Oklahoma City crude confirm the conclusions of Ferris, Cowles and Henderson[5, 4] that the lower melting point waxes have a definite plate crystallographic form, and that with increasing melting point the needle and mal-crystalline forms predominate or impress their

(Continued on Page 62)



Vogt Valves

Eliminate Hazards

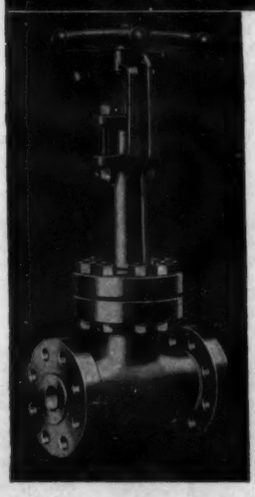
Positive control and safety are paramount in handling the liquids and gases of modern industry at ever increasing temperatures and pressures.

Safety is inherent in Vogt drop forged steel valves because of the liberal safety factors employed in their design and the increased strength and ductility resulting from the working of the metal under powerful forging hammers. Where severe abuse, erosion or corrosion are unavoidable any stainless steel or alloy can be substituted for carbon steel.

HENRY VOGT MACHINE CO.
INCORPORATED
LOUISVILLE, KY.

Manufacturers of: Drop Forged Steel Valves and Fittings, Oil Refinery Equipment, Water Tube Boilers, Ice Making and Refrigerating Machinery, Heat Exchangers.

New York Chicago Cleveland Philadelphia Dallas Cincinnati Kansas City



Our F-7 Catalog describes the complete line of Vogt drop forged steel valves and fittings and will be sent to responsible persons upon request.

A Vogt Forged Valve or Fitting for Every Need

Use of Trichlorethylene in Centrifugal Dewaxing of Distillates Containing Lubricating Oils

By CARL F. PESTER
Standard Oil Development Co.*

During the past six or seven years, the Separator-Nobel (S-N) Co., of Stockholm, Seweden, has been experimenting with a centrifuge for use with heavy solvents, and has now developed this machine to a point where it is being offered to the petroleum industry for dewaxing. The machine is built according to Separator-Nobel specifications by the Swedish DeLaval Co.; and, while of a construction somewhat similar to the standard machines made by this company, has a special bowl which permits the discharge of the petrolatum from the center of the bowl and of the bright stock from the periphery—the reverse of the centrifugal process using naphtha as a diluent. This special bowl design is necessary due to the fact that the solvent—trichlorethylene—in which the oil is dissolved has a high specific gravity. Because of the great difference between the specific gravities of the solvent and oil it is possible to operate the machines at slower speeds than necessary with naphtha dilution, or from 8,000 to 9,000 r.p.m. against 15,000 to 17,000 r.p.m. for the supercentrifuge.

The advantages claimed for the S-N dewaxing process are that the machines will give greater throughputs of dewaxed oil per machine than the usual methods. Lower dilutions of solvent, higher chilling rates (10° to 15° F. per hour), and a smaller spread between the final pour-point of the finished oil and the centrifuging temperature are also claimed. These factors would permit a considerable reduction in the volumetric capacity of the plant, and also in the refrigeration required. Further advantages of the solvent are that it is nonflammable which, consequently, eliminates fire hazards. Its high specific gravity and immiscibility with water permit storage under a covering layer of water, thereby reducing evaporation losses in tankage to a minimum.

A pamphlet has been prepared by the Roessler & Hasslacher Chemical Co. giving the physical properties and uses of trichlorethylene; and, in an article published by the same company in Ind. Eng. Chem., October, 1932, p. 1,164-8, the stability of this solvent and its corrosive effects are quite thoroughly discussed. The following quotation is the summary of this article:

"Trichlorethylene does not decompose in darkness. It is not decomposed in light unless oxygen is present. The presence of traces of certain antioxidants prevents the decomposition in light.

"Trichlorethylene does not decompose on heating up to 130° C. It may decompose on heating in the presence of oxygen unless antioxidants are present.

"Trichlorethylene does not hydrolyse. It is only slightly affected by ferric chloride. The ordinary metals do not catalyze decomposition of trichlorethylene. Trichlorethylene is not corrosive if antioxidants are present; even in the absence of these substances its corrosive effect is small."

The physical properties of trichlorethylene are shown in Table 1.

Experimental Work

Since the sponsors of the S-N machine claimed that the separator was capable of giving large throughputs with stocks of low wax content, experimental work was carried out on such an oil. Operation on a stock of this type is, in general, discontinuous; and it is only possible to secure continuous operation by artificially increasing the petrolatum concentration. Although primary interest was in low petrolatum content oils, additional tests were run on stocks which are currently handled by other dewaxing methods. In Table 2 will be found results of typical runs at varying dilutions and chilling temperatures on several different feed stocks.

From the foregoing tabulation it may be readily seen that the throughput per machine is very high for oils of low wax content, diminishing as the petrolatum increases. It will also be noted that in the former case the spread between chilling temperature and pour on the finished oil is considerably less than is the case with high wax content stocks. Another interesting point is that the machine handled stocks which had not been completely refined, giving about the same throughputs with completely refined stocks. Runs 6 to 9, inclusive, were made on an acid treated, neutralized, reduced, and filtered stock; whereas runs 10 through 12 were made on a stock handled in a similar manner, except that it was not filtered prior to centrifuging. It has been found that dewaxed oils produced by this machine have a cloud point quite close to the pourpoint, the difference being about 5° F.

Experimental Work

The experimental work on this machine, of which the above data represent only a part, has shown rather definitely that the following conclusions may be drawn:

1. In general, the Separator-Nobel centrifuge will dewax oils which can be handled by the usual centrifugal means, showing up to advantage on oils of low wax content and undecolorized stocks.

2. The S-N dewaxing method uses somewhat lower solvent dilutions than processes employing naphtha as the diluent.

3. At any given dilution, the yield of dewaxed oil can be increased by taking lower throughputs.

4. For a given throughput and pour, yields of dewaxed oil usually increase with increased oil dilution.

TABLE 1

Formula	C_2HCl_3	
Molecular weight	131.4	
Color	Water white	
Specific gravity (Referred to water at 39° F.)	Temperatures (°F.)	Specific gravity
	32	1.4996
	59	1.4762
	86	1.4514
	113	1.4263
	139	1.3997
Pounds per gallon		12.25
Viscosity at 77° F. (centipoises)		0.550
Viscosity at 122° F. (centipoises)		0.446
Viscosity at 167° F. (centipoises)		0.371
Boiling point, °F.		188
Freezing point, °F.		—135
Coefficient of expansion, at room temperature		0.001193
Heat of vaporization, B.t.u. per lb.		104.5
Specific heat (liquid), B.t.u. per °F.		0.256
Solubility of water in trichlorethylene (86°F.)	0.017 g. per 100 at	50° F.
	0.035 g. per 100 at	82° F.

Plant Design

The design of the equipment for carrying out the process can be substantially the same as that for the commonly known centrifugal dewaxing plant. Actually, many improvements over the older type units have been incorporated in S-N centrifuge plants designed to date.

The low dilution and high allowable chilling rate permit the use of much smaller chilling drums, giving a shorter holdup in the system. Consequently, when charging stocks the time required for the change and the contamination involved are greatly reduced. With these conditions, it is apparent that continuous chilling should be possible. Continuous chilling shows many advantages over batch chilling, including a lower plant cost (about 20 per cent lower), a smaller requirement of solvent on hand (about 50 per cent lower), simplified operation, a greater refrigeration recovery, and, consequently, a smaller refrigerating plant. The operating cost of a continuous chilling plant is estimated to be about 15 per cent lower than that of a batch system. The above facts clearly indicate that batch chilling should not be considered.

In designing plants for high pour feed stock, the trichlorethylene should be heated to about 120° F. in a commercial exhaust steam preheater and pumped through a mixing column with the feed and then through a commercial cooler in which the solution should be cooled to about its pourpoint. The solution should then flow through the chillers, entering at the top and leaving at the bottom to prevent heat convection currents. The chiller volume should be based on a chilling rate of approximately 12° F. per hour. It is probable that higher chilling rates may be permissible; however, this fact has not been definitely determined. Actually, much higher chilling rates are not possible with the internal coil-type chiller; as the coil surface required fixes the minimum size of the tank and, thus, sets the maximum chilling rate at from 10° to 15° F. per hour. The chillers should be equipped with agitators in the top. The last chiller should be slightly elevated, and the level maintained just below the top by means of a level controller operating the feed pump. The solution can then flow from the last chiller to the centrifuges with no intermediate feed tank. Connections should be provided on each chiller, so that the solution may be pumped from one chiller to any other chiller.

The centrifuges are totally enclosed; and, accordingly, very little trichlorethylene vapor should be present in the centrifuge room. The petrolatum is melted in the centrifuge by means of closed exhaust steam coils. This eliminates the usual petrolatum-water settling tanks and hot water circulating system.

In view of the simple operation of both the centrifugal plant and the solvent removal still, it is feasible to have these two units operating integrally. This procedure eliminates the intermediate storage tanks, and thereby decreases handling and evaporation losses as well as the quantity of solvent necessary in stock. For feed stocks having a small percentage of petrolatum solvent removal still should be used.

The still should be designed for exhaust-steam heating, so as to prevent a high film temperature; and the maximum temperature to which the solvent is subjected should be 230° F. The solution should be preheated to about 165° F. by means of the overhead solvent vapors, and then further heated to 230° F. with steam in a special shell-and-tube vaporizer and flashed into the tower. Between 80 and 90 per cent of the solvent present (depending on the mol per cent in the solution) will be vaporized in this heater. The tower need have only entrainment baffles above the point of flash, but should have about 10 bubble cap trays below this point. Exhaust steam (about 1 pound per gallon of oil) should be used in the bottom of the tower as a stripping medium. In view of the large quantity of solvent remaining in the oil at the point of flash, some auxiliary heating means must be provided just below this point to supply the required latent heat of the solvent and prevent the condensation of steam. The solvent-free oil from the bottom of the tower should be flashed into a vacuum drum for the removal of entrained moisture, so as to give a bright stock.

No Auxiliary Heater Required

The still for the petrolatum should consist of a packed tower and a small feed vaporizer. Condensation of steam in this tower is permissible; hence no auxiliary heater is required. The overhead solvent vapors and steam should discharge to the bright stock still overhead condenser.

If necessary, the equipment could be operated under a slight vacuum to keep a lower temperature; however, atmospheric operation is preferred, as it will give lower solvent losses. In view of the fact that no air or light is present in the still, it is felt that no appreciable corrosion will take place at the design temperature of 230° F.

Trichlorethylene is not poisonous, but has an intoxicating effect upon humans. Accordingly, all closed rooms should be equipped with ventilating systems. Down-

(Continued on Page 62)

TABLE 2

Stock—	Gravity (°A.P.I.)	Saybolt viscosity at 210° F.	Pourpoint (°F.)	Dilution (oil to trichlorethylene)	Chilling temperature (°F.)	Pourpoint bright stock (°F.)	Spread between chilling temperature and pourpoint (°F.)	Yield bright stock (per cent)	Bbls. per day per machine
1. Reduced distillate	25.4	110	30	50:50	—25	2	27	95.2	84
2. Reduced distillate	25.4	119	30	50:50	— 2	10	13	97.2	116
3. Reduced distillate	25.4	119	30	50:50	0	12	12	97.8	116
4. Reduced distillate	25.4	119	30	55:45	1	20	19	98.2	110
5. Reduced distillate	25.4	119	30	55:45	0	20	20	98.2	102
6. Bottoms	24.3	135	95	40:60	—24	20	44	87.1	52
7. Bottoms	24.3	135	95	45:55	—19	22	41	87.8	53
8. Bottoms	24.3	135	95	50:50	—25	28	53	85.3	66
9. Bottoms	24.3	135	95	55:45	—25	28	53	83.7	53
10. Bottoms	23.8	140	95	40:60	—25	12	37	86.5	60
11. Bottoms	23.8	140	95	40:60	—20	12	32	87.0	59
12. Bottoms	23.8	140	95	40:60	—14	20	34	88.7	49
13. Bottoms	26.5	65	80	45:55	—18	40	47	89.0	41
14. Bottoms	26.5	65	80	40:60	—25	24	59	85.1	38

*Presented at third midyear meeting, American Petroleum Institute, Tulsa, May 18, 1933.

Design and Operation of a Small Experimental Cracking Unit for Routine Refinery Control

By W. W. GARY and J. T. WARD
The M. W. Kellogg Co.*

Experimentation with commercial size equipment to determine optimum cracking conditions is generally somewhat handicapped by plant limitations and the necessity for the refiner to maintain certain specific time schedules of production. Also, due to the magnitude of operations, such plant tests are costly compared with results to be obtained from laboratory equipment. A laboratory pilot cracking unit presents the ultimate in desirability for experimental work, provided the data obtainable are representative and sufficiently comprehensive. It may serve three purposes, viz.:

1. Operating control. — The acquisition of information best to adapt existing commercial equipment to produce the maximum quantities of those products which can be marketed at the greatest profit.

2. Research.—The development of new and improved methods of processing.

3. Design.—The establishment of design information for operations on proposed future commercial installations.

Prior to the era of "antiknock," a cracking plant was appraised principally from the standpoint of yield and cost, and the methods of processing were comparatively confined. Laboratory cracking methods at that time generally consisted of static tests—the equipment comprising bombs, which were charged with the oil in question and heated to a predetermined bomb pressure.

It was soon found that development of new laboratory apparatus was necessary, and that laboratory equipment—to be a reliable source of information—must necessarily involve the use of continuously operating miniature pilot plants which duplicate as closely as possible the essential conditions maintained in a large commercial unit; i.e., pressures, soaking times, temperatures, and fractionation.

Laboratory experimental cracking units were built by certain of the oil refining companies; but little information as to their construction, or regarding the reliability of the results obtained, became available. As a manufacturer and builder of cracking equipment, the M. W. Kellogg Co., at an early date found it desirable and necessary to develop pilot plants in which all of the required cracking operations could be carried out in a representative manner. During this period The Texas Company made available its experience with an autoclave type of pilot plant. The Standard Oil Co. (Indiana) developed a continuous flow laboratory unit, certain features of which were adopted by the Kellogg company and contributed materially to the success of this type of apparatus.

Laboratory Unit

The laboratory of the Kellogg company has two complete miniature plants. Each of these units has been continually and progressively changed: First, to cope with the trend of the industry; and, second, to incorporate features resulting from field and laboratory research. A degree of refinement has been reached wherein practically all commercial types of cracking processes may be duplicated with a range of flexibility even surpassing that possible in field practice. The units produce finished products which are constantly controlled to the proper specifications.

Each pilot cracking plant consists of four separate cracking zones. These zones are so constructed that temperature gradients, pressures, and reacting volumes may be varied to meet arbitrary requirements. All zones, if so desired, may be operated simultaneously — permitting, for example, viscosity breaking, naphtha reforming, vapor phase and high pressure cracking as concurrent operations. When a multiplicity of streams is in operation, the proper recycle charges are fractionated within the tower equipment, and are continuously returned to their optimum cracking zones.

Researches on "combination" cracking have been possible on these pilot plants —establishing ultimate yields, time-temperature relationships, and product characteristics (including antiknock). Comparable results would have been impossible by separate operations, due to the fact that the various furnace charging stocks for a given cracking zone may have continuous source from products of any or all other cracking zones, such stocks being in definite proportion to a given virgin charge.

A feature of the equipment includes a continuous stabilizer for the gasoline produced. Effects of stabilization on ultimate gasoline yields and octane value can be accurately determined, together with changes in gasoline volatility under varying cracking conditions. Volatility has recently become of more importance in the industry owing to the winter and summer grades of commercial gasolines which are marketed.

Tar specifications are also an item of control. It is occasionally desirable for a refiner to produce a high melting point pitch during certain periods of marketing conditions to decrease the yields of low value products. When so doing, the effects on plant capacities, coking characteristics of charge, and antiknock value of product govern the degree of such variation from normal practices. On the other hand, it may be desirable for the refiner to control the cracking conditions to permit the manufacturer of fuel oil of the lowest economical pour test; and, by research on the pilot plant, optimum conditions can be determined for producing the most salable products from any given charge. Thus, the pilot plant plays an important part in predicting operations on unknown stocks, and its operation must be sufficiently flexible to meet widely different operating conditions.

It might at first be concluded that "multiple-stream operation" would not permit inspection of the products from the separate zones. However, this is not the case. Aedquate intermediate point sampling devices are provided; so that the individual charges and products may be examined at will, and the proper processing control maintained.

Generally speaking, laboratory experimental equipment, especially at high temperatures, is subject to greater radiation heat losses than are encountered in plant experience. When fractionation and liquid-vapor equilibrium conditions are of importance, such as in a cracking plant, special precautions are necessary to prevent these heat losses in small equipment. For this reason the pilot plants are equipped with electrical windings for adiabatic control, and in all cracking zones skin temperatures are observed and recorded. This was found necessary particularly with operations involving soaking drums, where normal plant heat losses must be paralleled in experimental equipment more correctly to duplicate soaking conditions. Additional control is afforded by the use of electrical heating units in the cracking zones. Records of the power inputs to these zones have greatly increased existing knowledge of "heats of cracking."

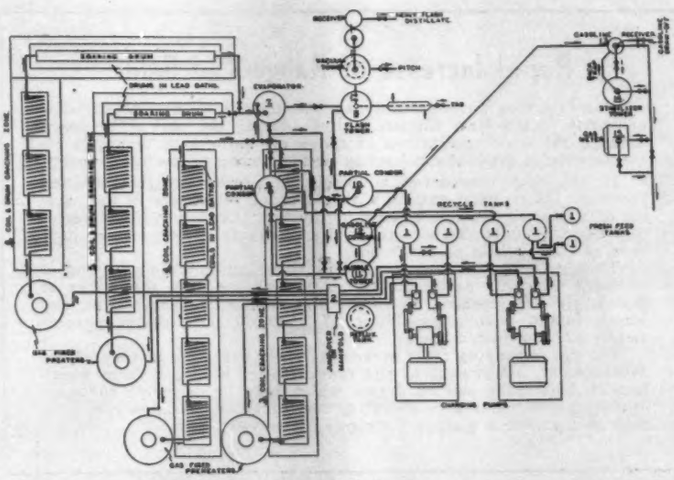


Figure 1. Design of Pilot cracking unit

The flexibility of these pilot plants may be visualized from the range of operating conditions afforded. The units are capable of pressures from atmospheric to 5,000 pounds per square inch. Temperatures as high as 1,250° F. can be maintained with special additional provisions for going to 1,600° F. on particular apparatus. Soaking times are practically unlimited, permitting cracking times of from a fraction of a second to as high as 30 minutes. When operation is to be accomplished by coil and drum, chambers of any desired dimensions and volumes may be installed.

Explanation of Equipment

A plot plan of one of the pilot cracking units is shown in Figure 1. An important feature considered in the original layout of this unit was the arrangement of equipment to permit access to all parts, and yet provide for short transfer lines from the cracking zones to the tower equipment. This is shown by the centralizing of zone outlets close to the evaporator, whether from drums or coils.

The fresh feed and recycle charge tanks, 1, are positioned at a proper elevation upon a platform. This elevated position provides for adequate pump suction and easier observation by the still operators. The bottom outlets from these charge tanks lead to separate charging pumps of variable capacity. All pump discharges are piped to a centralized point, indicated in the figure by 2. From this point the charge lines lead to each of the numerous cracking zones. This arrangement permits changing the flow from any charge tank to any cracking zone merely by providing the proper jump-over connection.

Each cracking zone inlet leads from a gas-fired preheater which discharges into the main cracking coils. These preheaters heat the incoming charges to temperatures up to 800° F. or less. The preheater coils which are made of three-eighths inch inside diameter extra heavy tubing are immersed in circular lead baths to avoid overheating and provide uniform heat application.

Several Coils Installed

The cracking coils for the various zones consist of a series of sections, each section being provided with a separate lead bath. The lead baths are individually heated and heavily lagged. Each bath is provided with thermocouples for both the oil and the lead. The coils vary in diameter from one-sixteenth to three-eighths inch inside diameter, and are of steel or alloy tubing. Several coils of different dimensions are installed in each zone, allowing a selection of volume capacity per unit temperature gradient. All coils are accurately calibrated for volumes, and temperature curves have been established for each section under widely different operating conditions.

Temperatures of the baths are maintained electrically with immersion heaters controlled by rheostats, centralized on the operating panel board. The oil undergoing cracking is heated according to a desired temperature gradient with the proper volume relationships as provided or proposed in an existing or contemplated commercial unit.

The electrical energy required for temperature maintenance is recorded for each bath which, when properly evaluated against blank determinations, yields information on total heats and heats of cracking.

Zones 3 and 4 are employed for coil cracking, while zones 5 and 6 are provided with soaking drums of different volumes. As previously stated, additional drums of various shapes and volumes are provided which can be inserted in place of those shown when desired.

The drums are also immersed in lead baths, and this affords knowledge of skin temperatures and adiabatic control. These baths are also heated electrically, and are arranged in such a manner that temperature gradients through the drum, comparable to commercial practice, may be maintained.

Each cracking zone outlet is provided with a back pressure throttle valve—thereby allowing variable pressure control on each zone.

The evaporator, 7, may be operated under pressures from atmospheric to 500 pounds. Closed coil reflux is provided at the top of the tower, below which are baffles. A gauge glass is used for liquid

(Continued on Page 62)

*Paper presented at third midyear meeting American Petroleum Institute, Tulsa, May 19, 1933.

Range Oil Burners Developed in New England Offer Large New Market for Oil Industry

By L. F. SPEARE and C. B. COOLEY
Gilbert & Barker Manufacturing Co.*

Practically all range oil burners are constructed on the same basic principles, but differ in certain features of design which greatly affect their performance. In general, the complete unit as installed in the kitchen range consists of three parts.

1. The burner proper where the oil is vaporized, mixed with the necessary amount of air, and burned.

2. The regulating valves which control the volume of flame or the rate of combustion.

3. The oil reservoir which may differ in form according to the demands of the particular installation.

In its simplest form the burner itself consists of a base, usually of cast iron formed of two or more annular fuel-vaporizing grooves with alternate air channels. This base is surmounted by a series of concentric perforated cylinders or sleeves of which each pair forms a combustion chamber above its own vapor groove. The sleeves are made of a special high-chromium alloy steel, particularly adapted to resist the effect of continued heat. The temperatures encountered vary from 1,200° F. to 1,750° F. with a reducing atmosphere on one side of the steel and an oxidizing atmosphere on the other. A reinforced asbestos ring is usually placed in each groove for ease in lighting. One or more cover plates resting on the top of the nested cylinders baffle the flame and, by closing the air passage, force the air through the perforations into the gas chamber.

Combustion Is Noiseless

In this construction the usual relationship of combustible and supply of oxygen is reversed; an examination shows innumerable jets of air surrounded by an atmosphere of vaporized oil. This form of progressive combustion is noiseless, and gives a clean blue flame of intense heat with no smoke, soot or odor.

One or more of these burners is rigidly supported in the fire box of the stove or heater. The supply pipe conveys the oil by gravity to the vaporizing grooves, the rate of flow being governed by the regulating valves. For the common kitchen stove installation the fuel supply consists of a two-gallon glass bottle inverted above a suitable reservoir which maintains a constant oil level at proper height. The principle is similar to the common water cooler, and has proved simple and reliable. With this arrangement the oil level in the base can rise only sufficiently to wet the lighting rings for quick starting, and under no condition can it overflow the vaporizing grooves.

In starting the burner the valves are opened, and the fuel in the asbestos rings is lighted with a convenient torch. The base temperature rapidly rises to the vaporizing temperature of the oil and, by the process of distillation, supplies each combustion chamber with a continuous flow of oil gas. In five to ten minutes the burner will have reached a full flame, and the valves are adjusted for the desired amount of heat.

The major differences in burner designs lie in the construction of the base and the method used in vaporizing the oil and distributing the resulting gas. In one class the oil is fed to a central vaporizing cup; and, after the initial heating-up period, gas only is allowed to flow to the vapor grooves. In another design the vaporizer takes the form of a wide annular trough, where vaporizing of the fuel takes place. In a third class the oil is fed directly to the outer fuel groove, where it is vaporized and fed to the other grooves. With this latter method the amount of oil in the base is held to a minimum, making the burner particularly responsive to the control valves.

Many modifications of these basic types have been made, each design having good features and some disadvantages. In all designs of either type it is necessary to give considerable attention to the formation, position, and ease of removal of carbon deposit. The design must be such that distillation takes place at a relatively low temperature to avoid thermal decomposition which would result in a great increase in the amount of carbon residue formed.

History and Development

The demand for a suitable type of oil burner for space heating and cooking is not of recent origin. The dirt and labor coincident with the use of wood or coal makes these latter fuels particularly undesirable in the kitchen. As early as 30 to 40 years ago considerable inventive ability was directed to this problem, and resulted in a great variety of designs of notable ingenuity. These pioneers plainly understood the fundamental requirements, but were greatly handicapped by a lack of suitable materials. At this period kerosene or coal oil was the only safe, widely distributed fuel, and few of these early burners would operate satisfactorily on our modern low-cost range oil.

Continued effort resulted in the development of two distinct types of burners.

1. Those employing a wick, usually of cylindrical form and in other general features resembling the common Rochester lamp.

2. The wickless or "blue-flame," type vaporizing the oil in a cup or annular groove and burning the resulting vapor.

The first type is necessarily restricted to the use of kerosene, and is gradually disappearing from general use. Our present stove burner is a logical development of the second type. In this improved form it is able to burn a heavier grade of fuel; and is clean, odorless, silent, convenient, and economical.

The first appearance of range oil burners of any particular importance in the domestic market, however, was in 1924. During that year approximately 300 burners of this type were sold. It is of interest to note that these particular burners differed from the present-day units in that they were of a square design. These units were not particularly efficient, required frequent cleaning, and suffered somewhat due to the fact that suitable materials to withstand high temperatures were not available at that time.

During 1925 this market broadened to total sales of 3,000 such burners. About this time one enterprising manufacturer designed an oval-shaped burner which was intended to be completely adapted, as a single unit, to the average fire box of the standard kitchen range. Here again failure occurred in achieving satisfactory results from the customer's standpoint, due to the fact that the burner sleeves would distort badly after a short period of operation. For the most part, all of these burners were recalled from the field by the manufacturer and replaced with models having cylindrical sleeves and on which has been predicated most of the improved design found in the present-day burners.

As an example of the change in attitude towards this type of heating unit, Table 1 classifying approximate sales over the past three years will be of interest.

Probably 90 per cent of the total range burner production to date has been sold in the New England area.

Phenomenal Development

Range burners in the majority of cases have been used for cooking and room heating, and up to the beginning of the year 1932 were for the most part installed in the customers' present coal or wood stoves. The fact that thousands of factory workers are located in the New England states, many of whom operate their cook stoves for both cooking and heating, closing off all but the kitchen and one or two adjacent rooms during the winter, plus the fact that the price of oil compares very favorably with the price of coal in New England, has influenced up to the present time the location of the major market in this particular section of the country.

The coal strike occurring in 1925 was an important factor in promoting the range burner market, due to the fact that the New England coal supply was practically shut off for a long period during the heating season.

During the last two years range burners have found their place in the better class of homes in this territory. This is partially due to the psychological effect of the opportunity afforded through this means to avoid some of the unpleasant features connected with the use of hard fuels for general domestic requirements. The use of a range burner—burning range oil—as opposed to hard fuels obviously provides greater cleanliness and convenience; and, to a certain extent, is an important health factor through its ability to deliver uniform heat.

The most rapid advance in the use of range burners began with the year 1930, and the volume of business has practically doubled each succeeding year in the New England territory.

New Products

The adaptation of range burners to complete units has brought out several new products since 1931. The production of circulating and radiating-type room heaters showed a marked up-swing during this period. Most of these heaters have been attractively designed, following modernistic trends in appearance, and include especially designed combustion chambers together with unusually large radiating surfaces intended solely for operation in conjunction with range burners. In many instances manufacturers are shipping completely assembled units with burners included. Obviously, units of this type produce much higher efficiency than has been obtained generally in conversion jobs.

During 1932 the first storage water heaters, designed to operate with built-in range burners, made their appearance in the market. These units are available manually-operated and automatically-operated. The automatic units usually function by means of an immersion type aquastat consisting of sylphon bellows, which in turn operates a float-type control valve automatically turning the burner from high fire to pilot light, or vice versa.

During the latter part of 1932 considerable development work produced the first showing of oil burning kitchen ranges complete with burners. For the most part these ranges are similar in design to the latest developments, from the appearance standpoint, of the modern gas and electric ranges, and are described rather completely by the advertising slogan of one important manufacturer which reads "gas-stove convenience with oil-burning economy."

The outstanding feature of the last year is the development of a vaporizing burner of a type and size suitable for heating the bungalow or cottage home. The construction of this burner is similar to that of the smaller units, but the various equipment items are specifically designed to enable easy installation and fully automatic operation.

A trouble-free oil pilot enables thermostatic control to be employed, placing this burner in the same class as the more expensive power burners. The outstanding features of this unit are its simplicity, freedom from moving parts, low cost of operation, and absolutely noiseless combustion. Its range is limited to approximately 300 square feet of direct steam radiation, which conflicts in no way with the logical field of the power burner. The average consumption of these units may be estimated at 1,200 to 1,500 gallons per year.

Special units of this type and capacity will undoubtedly be marketed in volume during the next heating season by a comparatively few manufacturers who have been devoting a tremendous amount

Rapid Increase of Range Oil Sales

The fact that an important new market for oil has developed—primarily in the New England states—during the past eight years, through the wide application of range oil burners to domestic requirements, is gradually becoming better known to the oil industry.

It has been considered advisable to present at this meeting pertinent information dealing with the range oil burner as the creator of a new oil market, in view of the fact that the 1932 deliveries to New England customers reached a figure in excess of two hundred million gallons of range oil.

This gallonage takes on particular significance when you stop to consider that this particular territory includes only the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island, with a population of 8,240,000 and having approximately 821,000 owned homes.

The acocmpanying facts present a rather complete history of the development and growth of the range burner business, from which logical deductions can be drawn which may be of value to those in the oil industry whose operating territory can reasonably be considered a potential market for range oil burners.

*Semi-annual meeting, A.P.I., Tulsa, May 30, 1933.

● Famous Oak Trees standing in front of historic Church of the Redeemer, Biloxi, Miss.

THERE IS SOUND ECONOMY IN PRODUCTS THAT Endure

Jarecki EQUIPMENT USED

Jarecki EQUIPMENT USED

Jarecki EQUIPMENT USED

Jarecki EQUIPMENT USED

● Thousands have marveled at the famed oak trees at Biloxi, Mississippi. Planted before the time of the notorious pirate Lafitte, they have withstood the ravages of time and the elements, and even today are hardy and in fine condition. Seed, soil and climate have combined to make them living monuments of durability.

The surest and safest way to economize under present-day conditions is to insist upon products with similar qualities of endurance. Such products give more service per dollar expended, and better service throughout the period of their life.

Experience, tradition and policies combine to give Jarecki Oil-Field Products a degree of durability that is known and recognized by oil men everywhere. Why not make our nearest store your headquarters for oil-field equipment?

Jarecki
MANUFACTURING COMPANY
Home Office and Factory—ERIE, PA., U. S. A.
General Office—ST. LOUIS, MO.
District Offices—Pittsburgh, Pa.; El Dorado, Kans.; Tulsa, Okla.; Newark, Ohio; Eastland and Dallas, Texas; Lawrenceville, Ill.
Branch stores at all important places in the Oil Country.

of research and development attention to this particular field. The potential market for a unit of this typ, suitable for the average cottage-type home, is undoubtedly of great proportions. It is quite apparent that with the general adoption of this new unit the 1932 range oil gallonage, previously stated as being in excess of two hundred million gallons, can easily be dwarfed in comparison to the potential market to be opened by the announcement of this particular heating device.

The development of these new products has also produced remarkable developments in the accessory fields. Special requirements of these new devices has led to the development of automatic controls for various applications, automatic ignition systems, such as trouble-proof pilot lights, high-low fire controls, and automatic pumps to maintain constant oil supply. It is obvious that these new developments represent a trend towards a continually broadening field for range oil burners which, obviously, will have its effect in increasing the market for range oil.

Competitive Conditions

It is safe to say that the majority of range burners in 1932 was produced by approximately 65 companies. A large number of new and often "unstable" manufacturers entered the field during the year 1931. The older and well-established manufacturers had been selling range burners for from $27 to $30 to the dailer, who in turn had been retailing them for from $50 to $60. The advent of these so-called "gyp" manufacturers, however, resulted in the development of serious price cutting. During 1932 dealers were able to purchase burners for as little as $6. These burners were often re-sold under their own trade names for from $15 to $30 installed, and in some cases for less.

There is no question that these low prices broadened the market, but it is safe to say that the various burners produced can be classed under three headings: excellent, good, and poor. As a result, customers purchasing low-priced "gyp burners" found that leaks often developed and burner shells soon warped, which as a rule created very unsatisfactory operating conditions.

Manufacturers and retailers were seriously affected by this price cutting; and naturally the older, more substantial manufacturers suffered to more or less degree. Many of these substantial manufacturers were forced to make lower priced units in an effort to meet price competition. This has resulted in the addition in practically every instance of a line of burners which can be sold at retail for from $30 to $40.

One result of the past year's experience proved that there is a large market for a range burner in this price class. It is also a well-established fact that burners in the higher-priced bracket will continue to find a good market.

In an effort to maintain the manufacture of range burners on a high plane, and with the objective of establishing good ethics in the range burner industry, a group known as the Distillate-Burner Manufacturers' Association was formed, which includes in its membership at the present time 14 manufacturers, who are building burners of the better grade. This association has recently affiliated with the American Oil Burner Association, but still retains its identity as a separate division in so doing. It was felt that this affiliation would result in bringing the power burner dealers more closely in touch with the possibilities existing in the range burner line, and mutually beneficial results obtained thereby.

Quality of Oil Important

Experience with fuel for use in range burners since 1924 has resulted in a great advance in fuel quality in the New England area. Kerosene, until recently, has been recommended almost universally as the most satisfactory fuel for use in range burners; but prior to 1932 even this fuel was responsible for a great deal of trouble with range burners, due to improper oil specifications. It is probably safe to say that during the year 1932 greater advances have been made by major oil companies in developing this special fuel to better qualify for this particular requirement than has been true of the entire prior period.

TABLE 1—APPROXIMATE ANNUAL SALES

Year	Range burners for conversion of coal ranges	Burners for space heaters	Miscellaneous (water heaters, etc.)	Complete Domestic storage water heaters	Total
1930	76,000	39,000	.....	....	115,000
1931	148,000	43,000	.....	....	191,000
1932	224,000	45,000	10,000	5,000	284,000
Total	448,000	127,000	10,000	5,000	590,000

The question is often asked by a customer as to whether No. 1 fuel oil* is a satisfactory fuel for use in this type of burner; and, while such a fuel can be vaporized and burned in a range burner, it is generally classed by most manufacturers as an unsatisfactory fuel, due to the tendency to rapidly build up carbon deposits in the vaporizing grooves, thereby requiring frequent cleaning of the burners.

As a typical example, a prominent New England burner manufacturer, located in one of the larger cities in Massachusetts, recently issued a general letter to users of their burner stating that: "Our past experience has revealed an ever-increasing number of service calls plus annoyance to the housewives due to the use of inferior quality fuel," and asked them to buy range oil only from companies whose trucks carried the emblem "Blank Burner Company, Certified and Bonded Oil." It may be significant, and undoubtedly will be of interest to know, that this emblem was applied to but one oil jobber's trucks in that particular city.

It is impossible to give a direct answer to the question as to what constitutes an oil which will be entirely satisfactory, or one which approaches the border line. Experimental work has shown that satisfactory oil can be produced only by proper selection of the crude fraction, followed by careful refining throughout every step of the finishing operation, to eliminate high boiling fractions and corrosive constituents. Gravity, color, and distillation range of the final product are not sufficient guides to use in judging the performance characteristics of the oil. Care in every step of the manufacturing operation is essential. Yet the satisfactory performance of these burners is absolutely dependent upon the use of a satisfactory grade of fuel.

Marketing Methods

Exact figures giving the total annual range oil gallonage for this territory from all sources of supply are not available. Experience, however, indicates that where range oil burners are used generally for cooking and heating purposes the year round an average annual consumption approximating 500 gallons per installation can be expected. On this basis, with a total of approximately 590,000 burners representing production for the last three years, it is obvious that the range oil gallonage delivered to customers in the New England states is running in excess of two hundred million gallons annually at the present time.

The rapid increase in the use of range burners during such a comparatively short period of time has resulted in the development of a most unique and unusual distribution system for the delivery of range oil to customers. The growth of this market was not visualized promptly by the major oil companies in this area, with the result that a large percentage of the distribution is being handled by jobbers purchasing in tank car lots. A large percentage of coal companies, ice companies, and the like are acting as range oil jobbers. Peddlers of all kinds are serving the public through these jobbers. It is a common sight to notice a great variety of trucks on which storage tanks have been mounted, and by this means are peddling range oil to customers.

Some of the better grade companies in range oil business have purchased small trucks, and have equipped them with relatively small capacity tanks of the latest tank truck design with built-in pumps and meters having a hose reel carrying as much as 100 feet of hose, equipped with a shut-off nozzle. It is an actual fact that in one of the larger cities in Connecticut during the past season range oil has been delivered to customers from fifty-gallon drums equipped with a shut-off nozzle mounted on push carts.

In tenement houses in the industrial centers it is common to find 50-gallon drums serving as storage for range oil located on porches, in kitchens, and in cellars. For tenement house work, those peddlers having tank trucks equipped with a meter and 100 feet of hose are enabled to simplify customer deliveries. The usual practice is to walk up the two or three flights of stairs, pulling the hose along, and by means of the shutoff nozzle control, fill the drum, returning to read the meter for the exact quantity delivered. This type of equipment has obvious advantages over the bucket method, which some of the less fortunate peddlers are compelled to use.

An amusing illustration recently noticed was that of an ordinary stake-body truck on which the ingenious owner had mounted a 500-gallon tank, such as is commonly used for underground gasoline storage, which had been equipped with an ordinary automobile tire valve. After securing a supply of oil from the jobber, he would apply air pressure by means of the tire valve to the contents of the storage tank, which greatly facilitated delivery of the range oil.

It is also possible to procure range oil at many service stations in this area, and it is not uncommon to see persons carrying a 2 or 3-gallon bottle down to the service station to secure the daily supply of range oil.

The important thing to be noted by the oil industry from the foregoing is that, while it will obviously be costly to major companies operating in New England to correct this condition and more directly control the available gallonage, those major companies operating in territories where the burner has just begun to appear have an opportunity to benefit by this experience in the East and make adequate preparation to keep their marketing problem in step with the increasing demand which will unquestionably duplicate to greater or less degree this recent New England experience.

Outlook for Development

While it is a fact that the majority of manufacturers have centralized most of their effort in New England, investigations indicate that a large potential market exists in the middle western and north central states. This particular market differs from New England, however, in that it covers greater area, a large portion of which is rural. Gas is quite commonly used for cooking in this part of the country, although coal stoves are used for heating. This would indicate that the demand in that territory will call for complete units of the circulating heater type with builtin range burners.

Considerable pioneering work has already been undertaken in this territory by several of the larger manufacturers. We believe that it is a common opinion that the distillate burner market is largely found in rural sections, and there is no denying that the rural market is of great importance.

Metropolitan areas, however, present a market of great importance, particularly where a large foreign element is concentrated in tenement districts. Economy and habit lead many people of this type to do their cooking and heating with coal and, where the cost of oil permits no particular increase in cost of operation, range oil burners can be sold in such areas.

The most important factor to the rapid promotion of sales of range burners in this middle western territory will be the availability of suitable range oil for this purpose. Surveys conducted by several of the prominent range burner manufacturers indicate that lack of this type of fuel is proving the most serious handicap in promoting range burner sales. It is our opinion that a general announcement that suitable range oil is available in middle western territory, at prices somewhat comparable with those prevailing in New England, would result in a tremendous increase in the adoption of range burners, which would obviously bring its benefit to those companies who lead in making this particular grade of fuel available to consumers.

Merchandising Methods

For the most part range burners are sold by manufacturers through:

(A) Direct dealers, such as coal and wood companies, hardware stores, department stores, plumbers, and the like.

(B) Distributors who have large dealer organizations, such as plumbing supply houses and hardware jobbers.

(C) Manufacturers' agents who develop their own dealer organizatoins, usually by means of making available for the dealers installation and service crews developed and operated by the manufacturers' agents who agree to install and service all burners sold by dealers who associate with the agent.

(D) Major oil companies by direct marketing to consumers. This method of selling range burners has been tried, to our knowledge, by one company only, but it is logical to assume that this should be an effective and attractive proposition, both to the manufacturer and the oil company if adequate preparation is made. The advantage of direct contact with customers by the major company will permit lower installed prices for an excellent grade of burner, plus the fact it will permit the oil company establishing a well entrenched position over a period of years to control range oil gallonage consistent with the effort expended through this direct selling plan.

Sales plans in New England usually provide for time payments over a period of one year, although a surprising number are sold for cash. A few oil jobbers have tried leasing burners to customers, but it has proved ineffective; and this practice has been largely abandoned.

Underwriters' Approval

The range burner industry had grown to large proportions before this type of equipment ever came to the attention of the underwriters' laboratories, which emphasize the restricted locality in which this range burner activity was centralized. The laboratories' first listings of range burners were made in April, 1932. Since that time, however, the laboratories have made a thorough study of the nature and use of these burners under various conditions and in various installations that may be encountered. Based upon this study they have determined the nature of the construction and performances deemed necessary to supply the degree of safety intended by the standard, and announced on January 17, 1933, that the laboratories were now ready to test and list as standard "oil burners for installation in stoves and ranges."

It is interesting to note that the underwriters have recommended that it is important that operating instructions be prepared by each manufacturer which include:

1. Specifications of fuel recommended.
2. How to start the burner.
3. How to adjust air and oil to get the proper flame.
4. How to shut down the burner.
5. How to take care of the burner.

The New England Gas Association recently reported through its industrial gas section that more than 200,000 domestic ranges, approximately 10 per cent of the total ranges in New England, are burning oil.

One company with 13,000 meters re-

(Continued on Page 62)

*(Commercial Standard CS 12-32), United States Department of Commerce.

Jet Pump Principles Promise Good Results When Applied to Oil Well Production Problems

By M. P. O'BRIEN and J. E. GOSLINE
University of California*

The basic prenomenon involved in the operation of a jet pump is the transfer of momentum from a high-velocity stream to a slower stream in contact with it. Referring to Figure 1, the jet issuing from the "drive nozzle" exerts a dragging force on the liquid surrounding it by mixing and thus transferring a portion of its momentum. The net effect is a loss of mechanical energy from the system as a whole—quite independent of the friction losses at the walls—but an increase in the energy or head of the suction stream and thus pumping results.

Neglecting friction entirely, the power loss resulting from the mixing of two streams of the same liquid, but of different velocities, in a cylindrical chamber is:

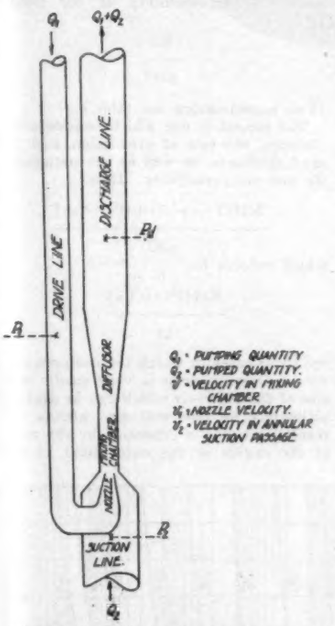


Figure 1—Schematic arrangement of jet pump

$$P = Q_1\gamma\frac{(V_1-V)^2}{2g} + Q_2\gamma\frac{(V_2-V)^2}{2g} \quad (1)$$

Where:

Q_1 and Q_2 are the volumes per second.

V_1 and V_2 are the average velocities of the two streams before mixing.

V is the average velocity of the combined stream after the mixing process has been completed.

γ is the weight of liquid per unit volume.

g is the acceleration of gravity.

P is the power loss.

The derivation of Equation 1 assumes that the velocities of the three streams are uniform across their sections, and a slight modification is necessary to take into account the actual velocity distribution. The unusual feature of Equation 1 is that no dissipative or frictional terms were included in its derivations; and we are forced to the conclusion that the mechanical energy lost must, nevertheless, remain in the mechanical form, but in such a way that it is not available to assist in the forward motion. In the imaginary "perfect fluid" of hydrodynamics this energy would remain in the form of eddies, but in a real liquid it is quickly converted into heat through the dissipative action of the viscous forces.

The mixing process is illustrated by Figure 2, in which the velocity distribution at different points along the axis, the outline of the driving jet, and the "mixing angle" are shown schematically. The region in which mixing takes place is the volume generated by revolving the lines AB and AC about the center line. Outside of AB the suction stream is not appreciably affected, and inside of AC the driving jet is unaffected. Between the two lines, transfer of momentum is in process, and energy is being added to the pumped stream. The rate of flow is the volume obtained by revolving the velocity curves about the central axis. Although it is not strictly correct to speak

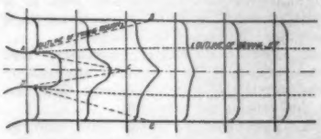


Figure 2—Schematic representation of velocity distribution in mixing chamber

of the outline of the driving jet—since the two liquids are in the process of intermingling—there is at every section a radius such that the volume moving inside this radius is equal to the volume originally issuing from the nozzle. The line shown in Figure 2 was obtained in this way.

Energy Loss Explained

From the curves of velocity distribution during the mixing process it is possible to obtain a qualitative representation of the mechanism by means of which the energy loss of Equation 1 occurs.

Turbulent flow consists of the random motion of small quantities of liquid back and forth across the moving stream. Referring to Figure 3, the center of gravity of the small mass of liquid shown has a velocity V, and relative to the center of gravity the outer and inner portions have velocities ΔV_1 and ΔV_2. If now this mass moves outward or inward to some new positions, it will carry with it momentum and kinetic energy corresponding to the velocity of the center of gravity, and in addition an amount of kinetic energy corresponding to the summation of the kinetic energy of its component parts computed relative to the center of gravity. In any real liquid the kinetic energy of this rotational motion is converted into heat at a rate proportional to the viscosity. The summation of the kinetic energy of rotation in a liquid of very small viscosity would equal the energy loss given by Equation 1.

The question now arises as to the effect of a high viscosity upon the mixing process and upon the operation in general. On the basis of numerous experiments on the flow of air, oil, water, steam and other fluids in pipes, it is known that for the same relative roughness of the pipe walls, the friction factors, velocity distribution curves, and all other features of the flow can be correlated on the basis of a quantity known as the Reynolds number, $\frac{Vd}{\nu}$, in which V is the velocity of the fluid, d is the diameter of the pipe, and ν is the kinematic visvosity of the liquid. Figure 4 shows the friction factors for lubricating oil, air, steam, and water in brass pipes. This curve indicates that, regardless of the fluid used, the friction factors are identical at the same value of the Reynolds number. Other experiments on pipe flow show that the velocity-distribution curves are identical in shape at the same Reynolds number; while work in aerodynamics indicates that the resistance coefficient of an object of a particular shape depends upon the Reynolds number, and not upon the absolute size of the object. These results justify the application of experimental data obtained from water-jet pumps to the prediction of characteristics of an oil-jet pump, provided that the Reynolds numbers for the two are identical or are both high, so that a considerable variation in the Reynolds number is not associated with a change in the character of flow. To clarify this statement, it should be noted that in Figure 4, in the region of high Reynolds numbers, the friction factor does not change rapidly.

Prediction of Performance

Combining Equation 1 with expressions for the friction losses in the connecting pipe lines, nozzle, throat and diffuser, the equation representing the head-capacity curve of a jet pump is found to be:

$$H = \frac{1-N}{N+M} \quad (2)$$

where

$$N = \frac{1+K_1+(1+K_s)M^2\left(\frac{R}{1-R}\right)^2+(1+K_d+K_t)R^2(1+M)^2-2R(1+M)-\frac{2M^2R^2}{1-R}(1+M)}{(+K_1)-(1+K_s)M^2\left(\frac{R}{1-R}\right)^2}$$

The symbols have the following significance:

$H = \frac{P_d-P_2}{P_1-P_d}$ (Velocity heads neglected as they are normally very small.)

$M = \frac{Q_2}{Q_1} = \frac{\text{Pumped quantity}}{\text{Pumping quantity}}$

$R = \frac{a_1}{a} = \frac{\text{Area of nozzle}}{\text{Area of mixing chamber}}$

K_s = friction factor for suction line based on V_2 and representing all losses between point of measurement of p_2 and tip of nozzle.

K_1, K_t and K_d are similar coefficients representing the loss in the nozzle, throat and diffuser, respectively.

[The derivation of this equation for the operation was presented by the authors in abstract at the Pacific Coast Applied Mechanics meeting of the American Society of Mechanical Engineers, Pasadena, Calif., January, 1933. The complete paper has been presented for publication in Publications in Engineering, University of California Press.]

Figure 5 is a comparison of the head-capacity curve computed from Equation 2 and experimental data obtained from a water-jet pump. The friction factors used in the computation were in some cases measured directly and in others taken from hydraulic tables. The close agreement between computed and measured values confirms the assumptions upon which Equation 2 is based.

The Reynolds numbers for the components parts of the pump, having an area ratio of 0.25 at the point of maximum efficiency, are computed as follows:

Driving nozzle:
$V_1 = 75$ ft. per sec.
$d_1 = 0.026$ ft.
ν = kinematic viscosity
$= 1.085\times10^{-5}$ cu. ft. per sec.

$$R_N = \frac{V_1 d_1}{\nu} = 180{,}000$$

Throat:
$V = 39$ ft. per sec.
$d = 0.052$

$$R_N = \frac{39\times0.052}{1.085\times10^{-5}} = 187{,}000$$

Suction area:
$V_2 = 27.2$ ft. per sec.
Hydraulic radius of annular suction area
$r = 0.00653$ ft.

$$R_N = \frac{V_2\times4r}{\nu} = \frac{27.2\times4\times0.00653}{1.085\times10^{-5}} = 65{,}400$$

To obtain complete similarity of operation, a geometrically similar oil-jet pump should be operated, so as to give identical values of the Reynolds number; but, practically, this restriction is not important so long as turbulent flow exists in both the driving and suction streams. In the case of pipes, turbulent flow exists under usual conditions at Reynolds numbers above 2,300, but for converging passages the value is higher. It is difficult to establish a lower limit at which the flow will always be turbulent, since small obstructions or vibrations of the piping tend to cause laminar flow to break down into turbulent flow; but in the absence of such disturbances it may persist to very great values of the Reynolds number. For the conditions under which jet pumps operate it seems safe to assume that the flow is always turbulent at Reynolds numbers above 20,000. These restrictions as to the Reynolds numbers above which Equation 2 is applicable apply only to the mixing chamber and diffuser, and not to the connecting pipe lines, for which the fraction factors can be estimated in either laminar or turbulent flow.

To illustrate the results of applying Equation 2, computations have been made for a jet pump which is to operate under the following conditions:

Production—150 bbls. per day.
Gravity—36.6 deg. A.P.I.

(Continued on Page 63)

*Before third mid-year meeting, American Petroleum Institute, Tulsa, May 19.
Authors' title is "Application of the Jet Pump to Oil Well Pumping."

Permeability of the Sand Influences Productive Capacity and Drainage Area of Oil Wells

By T. V. MOORE, R. J. SCHILTHUIS and WILLIAM HURST
Humble Oil & Refining Co.*

Permeability is a measure of the facility with which fluids can flow through a porous rock. It may be expressed as the number of cubic feet of fluid per day which will flow through a cube of rock, any side of which is 1 foot long, when the pressure at the downstream face is 1 pound per square foot lower than that at the upstream face.

Permeability[1] has a great influence on the ultimate recovery from oil fields; since it affects the drainage area of wells, the effectiveness with which gas energy and water drive can be used, the rate at which oil may be produced, and many other factors which control the efficiency of drainage.

The old-fashioned open-flow test[2] to determine the so-called "potential production" of wells is no more than a crude attempt to measure the productive capacity of the reservoir rock, which is governed to a great extent by the permeability.

Engineers have realized the importance of this quantity, and attempts have been made to devise means of measuring it. One method which has been used is the examination of cores in the laboratory.[3] The data obtained in this manner are in many instances very useful, and where the variations in relative permeability in a series of sands is desired it is perhaps the only practical method available.

Nevertheless, it is highly desirable to know the average permeability of the entire sand section around a well to fluids as they exist in the reservoir. For this purpose laboratory investigations are inadequate. In the light of the present knowledge of the subject it is impracticable to compute from laboratory data the permeability of the complex mixtures of oil and gas encountered in oil reservoirs.

Many important wells are not cored, and the opportunity for laboratory examination has been lost. Even when the entire producing formation has been carefully cored, the recovery is often poor. For these reasons it is desirable to devise a simple method for determining average permeability from tests which can be made on producing wells.

Productivity Factor

Where the aboslute permeability is not desired, the productivity factor[4, 5] and the specific productivity are useful. The productivity factor is defined as the number of barrels per day which a well produces for each pound difference in pressure between the well and the surrounding reservoir. It is determined by first measuring the subsurface pressure of the well when it is shut in, then flowing the well for sufficient time to allow the pressure to become substantially constant, and again measuring the subsurface pressure.

The rate of production, divided by the difference between the shut-in and the flowing pressures, is the productivity factor. This factor is almost directly proportional to the product of the permeability and the effective sand thickness of the well, and is a better measure of productive capacity than the "potential production" obtained by the nearly obsolete open-flow test.

The specific productivity is the productivity factor divided by the number of feet of sand exposed to the well. Thus, it is a better index to the permeability than the productivity factor. Nevertheless, these quantities are not absolute measures of permeability, and cannot be used in the same manner in predicting the performance of wells.

Actually, an oil reservoir is a highly complex system, containing sands of varying properties, and subject to many irregularities and disturbances in its operation. It is obviously impossible to determine the properties of each layer of sand or the effect of each lens of shale in the reservoir. But, for practical purposes, the average permeability of the sand around a well may be considered to be the permeability of a uniform sand which gives the best approximation to the performance of the actual reservoir. With this in view, it is necessary to determine the manner in which the ideal well in a uniform sand will behave; and then, by comparison with the behavior of the actual well, the average permeability may be found.

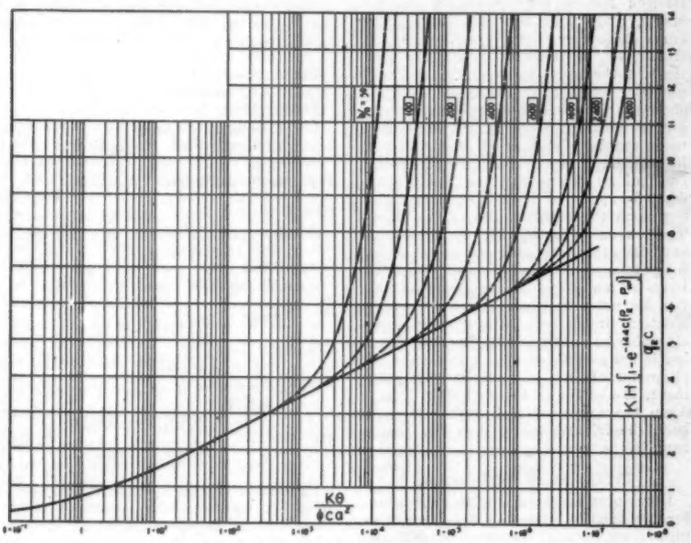


Figure 1—Constant well pressure

Mathematical Analysis of Performance of Ideal Well in Uniform Sand

The mathematical problem is one of flow in the unsteady state, i.e., one in which the pressures and velocities throughout the reservoir are continuously changing. When the well is opened, the pressure at the well bore is lowered—causing the fluid near the well to expand and flow toward the well. The loss of fluid from the reservoir lowers the pressure in the more distant portions of the reservoir, permitting the fluid in those portions to expand and flow to the well. Thus, the drainage area of the well is continuously enlarging and the pressure is lowered at progressively greater distances from the well.

In order to set up the mathematical equations necessary to predict the performance of the hypothetical well in a uniform sand, certain assumptions must be made. These are as follows:

1. The permeability, porosity, and sand thickness are uniform throughout that portion of the sand body that can be influenced by the well.
2. The velocity of the fluid flow at any point is directly proportional to the drop in pressure per unit of length along the path of flow.
3. The fluids expand as the pressure is lowered, the volume of the fluids increasing a certain definite percentage for each pound decrease in pressure.
4. The well bore is cylindrical, and penetrates completely the sand section.

In most wells these assumptions are sufficiently reasonable representations of the facts to permit their use—although whenever too serious discrepancies between the assumptions and the known conditions exist, the results of the calculation must be modified accordingly.

On this basis the relation between the many quantities involved has been derived for two cases: (1) that in which the pressure at the well remains constant; and (2) that in which the rate of production is constant. Further details as to the formulas derived are presented in the appendix.

It will be seen that these equations are complex, and that their solution must involve a great deal of computation. Fortunately, however, their solution may be presented as a series of curves by plotting certain ratios of the important variables, so that the final answer for any type of reservoir may be obtained without recourse to any mathematics more complex than multiplication and division.

Ratios of Variables

The first of these ratios is one which is proportional to time; but which involves also the size of the well bore, the permeability and porosity of the sand, and the compressibility of the fluids. It is:

$$\frac{K\theta}{\phi c a^2}$$

(For nomenclature see table.)

The second is one which considers the pressure, the rate of production, and the sand thickness, as well as the permeability and compressibility. It is:

$$\frac{KH[1-e^{-144C(P_R-P_w)}]}{q_R C}$$

which reduces to:

$$\frac{KH(P_R-P_w)}{q_R}$$

for those cases in which the compressibility or pressure drop is very small. The size of the reservoir which can be drained ultimately by one well also affects the result, and this is expressed by the ratio of the radius of the outer limit of the reservoir to the radius of the well, i.e., b/a.

For the case in which the pressure at the well is constant the relationship between these quantities is shown in Figure 1. It will be observed that during the early stages of production the curves for all sizes of reservoirs coincide, forming a main stem. However, the oil which can be produced is limited by the size of the reservoir; and, as production is continued, the area of influence cannot ex-

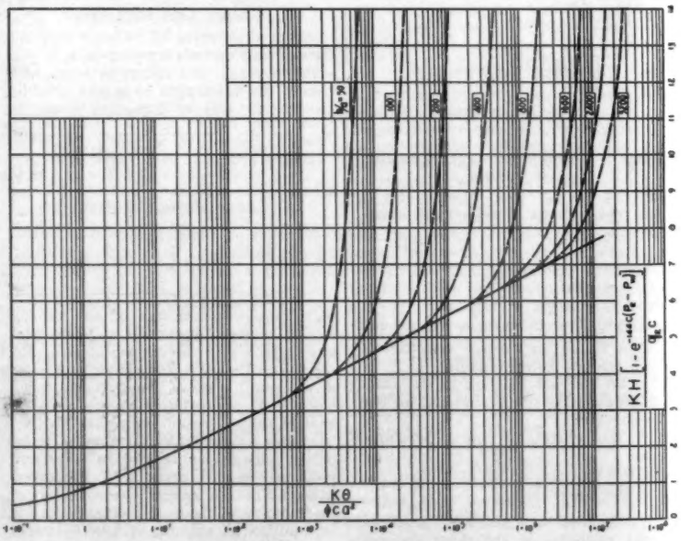


Figure 2—Constant-production rate

*Before third mid-year meeting, American Petroleum Institute, Tulsa, May 12.
Author's title is "The Determination of Permeability from Field Data."

STILL FURTHER IMPROVEMENTS IN THE LATEST GUIBERSON DUPLEX CATCHER

POSITIVELY NO DISTORTION OF CASING • ENGAGES 360° OF THE CASING

More compact, sturdy construction; ability to withstand greater weight without danger of damaging the casing; speedier passage into the hole . . . and still retaining well known Guiberson Catcher features such as a neat and positive stop within three inches; dovetail tracks guiding slips to casing walls at exact right angles to the fall; and definite operation regardless of fluid or mud and paraffin . . . that is the latest Guiberson Duplex Catcher, made especially for the safety of tubing in deep wells.

Install it in your new wells of greater depth. Change to it if old wells of greater depth are not adequately protected. By all means, leave no well without this inexpensive safeguard.

BEARS MORE WEIGHT WITHOUT DANGER TO CASING • ENCLOSED SPRING • IS SHORTER AND RUNS IN HOLE FASTER

"Better Be Safe Than Sorry"

The GUIBERSON CORP.
Box 1106, Dallas, Texas
California Branch: 1304 Security Title Ins. Bldg., Los Angeles
504 Wright Bldg., Tulsa — First and Locust Sts. Newark, O.

GUIBERSON
BETTER BE SAFE THAN SORRY

tend beyond the limits of the reservoir. Hence, these curves branch off from the main stem at the point at which the limitations as to the size of the reservoir first begin to affect the producing conditions at the well. The branches on the

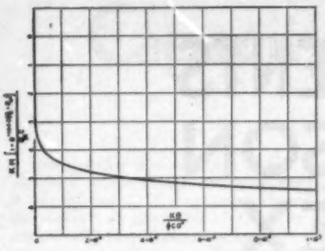


Figure 3—General pressure-decline curve, constant-production rate

curves for various reservoir sizes show the manner in which this occurs. This curve is, in effect, a general production-decline curve.

Figure 2, which is similar to Figure 1, shows the same relationship for the case in which the rate of production is constant. This curve is a general pressure-decline curve. For convenience these curves are presented on logarithmic co-ordinates.

In order to make clear the relationship which they represent the variables of Figure 2 are plotted on ordinary co-ordinates in Figure 3. It will be observed that this curve closely resembles the curve of pressure decline in an actual flowing well.

Another curve showing the relation between time, pressure, and cumulative production is shown in Figure 4, for the case in which the production rate is constant. This curve is used in calculating the permeability. In it the ratio:

$$\frac{K\theta}{\phi c a^2}$$

is plotted against:

$$\frac{Q_R}{H\phi a^2[1-e^{-144C(P_R-P_W)}]}$$

From these curves the effect of the properties of the reservoir on the production and pressure decline of wells may be deduced. These properties are: (1) porosity, (2) compressibility of the fluids, (3) sand thickness, (4) extent of the reservoir influenced by one well, and (5) permeability.

Porosity and compressibility are most important in determining the total amount of oil which the reservoir will ultimately yield, but have comparatively little effect on the pressure drop caused

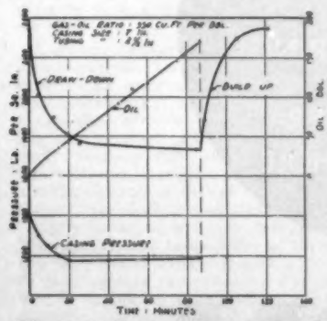


Figure 5—Typical draw-down and build-up curves

by a certain rate of flow. Sand thickness is an important quantity, and should be known to establish the permeability. The accuracy of the calculated permeability depends upon the accuracy with which the sand thickness can be established. As it is not always necessary to know the permeability exactly, the fact that it is often difficult to establish the sand thickness with precision is not a serious objection. The extent of the reservoir influenced by a given well becomes important only in the later stages of production, and does not influence the behavior of the well at the start of production. Permeability is the most important factor in determining the pressure decline at the well; and is, therefore, that quantity which can be calculated from the well data with greater accuracy. In the following discussion the methods of obtaining and interpreting the data required to calculate the permeability will be considered.

Interpretation of Field Data

The data required to calculate the permeability by this method are as follows:

1. Thickness of producing sand drained by the well.
2. Diameter of the bore hole.
3. Sufficient information regarding the properties of the oil and gas to permit the approximate calculation of the compressibility.
4. The data from a flowing test on the well, consisting of the following:

(a) The data for the "drawn-down" curve, i.e., the variation in the pressure at the face of the producing sand with time during the test.

(b) The variation in casing pressure.

(c) The oil and gas production during the test.

In determining the drawn-down curve the well is first shut in for sufficient time to allow the reservoir around the well to reach a state of substantial equilibrium. The time required for this varies greatly from well to well, but in most cases four hours is sufficient. The shut-in reservoir pressure is observed, and the well is opened on a choke of convenient size. With either a recording or multiple-reading subsurface pressure gauge, sufficient pressure determinations are made to establish the curve of pressure against time.

During the test the oil and gas production are measured at intervals with as great accuracy as possible, and frequent observations of the casing pressure are made.

In Figure 5 the draw-down curve and other essential data of a typical test are plotted. It will be observed that the production rate is not quite constant, and that the casing pressure shows that a considerable portion of the oil produced came from the casing of the well, and not from the producing sand. Obviously, only the oil produced from the formation during the test should be considered in these calculations.

In order to make the data comparable to the case for which the mathematical analysis is made, corrections must be applied to the observed data. In order to adjust the total production for the oil which is produced from the casing, the fluid level is calculated from the difference between the casing and reservoir pressures and the density of the oil. From the area of the annular space between the casing and tubing, the change in fluid level can easily be expressed as barrels of oil produced from the casing. By subtracting this quantity from the total production at several times during the course of the test, a curve of oil actually produced from the reservoir can be constructed.

In Figure 6 the data of a test are given, showing the production curve corrected for the oil produced from the casing. It will be observed that during the first few minutes the rate of production is not constant, and this condition should also be corrected. This may be done by using as abscissa not the actual time, but the ratio of total production up to the observed time to the production rate finally established. For instance, if a well had produced 50 bbls. during the first 65 minutes of a test and settled down to 50 bbls. per hour, the pressure observed at the end of 65 minutes would not be plotted against the total elapsed time, but against the one hour which would have been required if the production rate had remained constant at 50 bbls. per hour throughout the test. In Figure 6 a simple graphical method of accomplishing this is indicated.

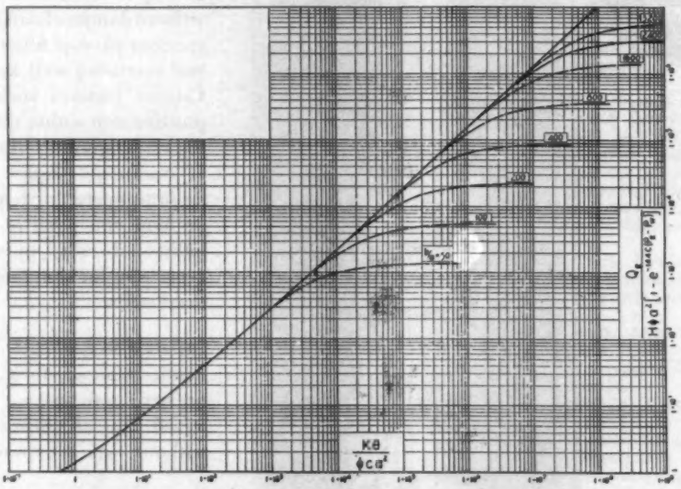


Figure 4—Cumulative production, constant-production rate

Having made these adjustments for the data, the next step is to calculate the compressibility of the fluids in the reservoir. The fluids are generally a mixture of oil and gas, and in these calculations the compressibility is that of the mixture. The fluids are assumed to expand in such a manner that a definite change in pressure causes a certain percentage of change in the density. Mathematically, this is expressed by the equation:

$$\frac{\rho_R}{\rho_W} = e^{-144C(P_R-P_W)}$$

which is the same as:

$$C = \frac{2.3[\log_{10}\rho_R - \log_{10}\rho_W]}{144(P_R - P_W)}$$

In other words, the compressibility is defined as the change in the logarithm of the density divided by the change in pressure. Whenever actual data on the density of the oil and gas mixture over the required pressure range are available, they should be used. Otherwise, the density of the mixture may be estimated from the gas laws, the solubility of the gas, and the approximate increase in volume of the oil due to the solution of gas.

The assumption that the density of the fluid varies according to the equation given is not an exact one; but is, over fairly wide pressure ranges, a reasonably close approximation. Figure 7 shows the curve of density against pressure for a mixture of oil and gas calculated from the solubility of the gas and the gas laws, and compares this curve to the one calculated on the basis of the above equation. It will be seen that the two curves give substantially the same relationship over a fairly wide range of pressures.

Porosity, another quantity which must be estimated, is best obtained by laboratory examinations of core samples; but may be estimated from measurements made on similar reservoirs. Fortunately, a large error can be made in estimating

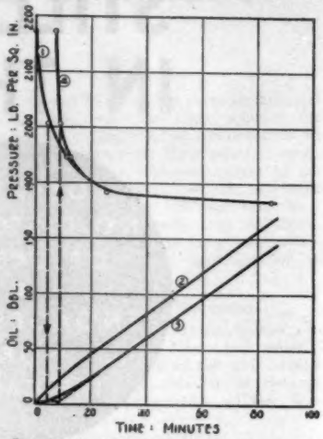

PRESSURE : LB. PER SQ. IN.
OIL : BBL.
TIME : MINUTES
① ORIGINAL DRAW-DOWN CURVE
② TOTAL OIL PRODUCED
③ " " " LESS OIL PRODUCED FROM CASING.
④ DRAW-DOWN CURVE TRANSPOSED TO CONSTANT-PRODUCTION RATE.

Figure 6—Transportation to constant-production rate

either the porosity or compressibility without seriously affecting the calculated permeability.

With these data available, the next step is to compute the ratio:

$$\frac{Q_R}{H\phi a^2[1-e^{-144C(P_R-P_W)}]}$$

and to read the value of:

$$\frac{K\theta}{\phi c a^2}$$

from Figure 4. By substituting the values of c, ϕ, a^2, and θ, the value of K is readily computed.

The theoretical pressure-decline curve may be calculated in a similar manner from Figure 2. In Figure 8 the actual data of the pressure decline are compared with the computed curve. From Figure 2 the pressure decline over a long period of time may be estimated in order to obtain some idea of the rate at which the pressure may be expected to fall as the production of the well is continued. How-

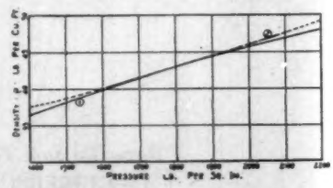


Figure 7—Density-pressure curves

ever, the limitations of the assumptions must be remembered, and the pressure decline estimated in this manner can be regarded only as an approximation.

It is interesting to note how the calculated permeability varies with the specific productivity. Figure 9 presents data showing the relation between these quantities from actual tests on a number of wells completed with 5-inch holes.

Pressure-Gradient Curves and Radius of Influence

One interesting application of this mathematical analysis is the calculation of the pressure-gradient curve around a well. In Figure 10 the pressure-gradient curves for a well operated at constant pressure is an indefinitely large reservoir

(Continued on Page 63)

Corrosion of the Threads of Oil Well Tubing Is a Particularly Vicious Form of Attack

By WALTER F. ROGERS
Gulf Oil Cos., Houston, Tex.*

Tubing failures in pumping oil wells have long been a source of trouble, and are frequently a major item in the lifting costs for a field. In recognition of this fact a major oil company has, and is, including in its activities a detailed study of all tubing failures which occur to its strings in service. In addition, each new type of tubing is tested to determine its value. These studies have resulted in the compilation of a large number of statistical data which show the action of the tubing in service.

Materials for Tubing Construction

Oil-well tubing has been manufactured largely from either wrought iron or steel. Starting with these two base metals, there are a large number of variations in the methods by which tubing may be made. Each type has its own particular advantages and disadvantages, and it is necessary for the purchaser to determine the characteristics which best meet his needs. The following list is an example of the various ideas which are incorporated in tubing:

1. Materials of construction:
(a) Electric furnace iron.
(b) Basic open-hearth steel.
(c) Wrought iron.

2. Alloy steels:
(a) Non-copper-bearing.
(b) Copper-bearing.
(c) Copper-molybdenum.
(d) Nickel, etc.

3. Methods of manufacture:
(a) Lap-welded.
(b) Seamless.

4. Shape:
(a) Plain-end.
(b) External-upset.

5. Protective coatings:
(a) Black.
(b) Galvanized.
(c) Leadized.

Methods for Testing Oil-Well Tubing

It is safe to say that until the last few years purchases of tubing have been confined to two materials, viz., plain-end wrought iron and plain-end steel. The necessity for tubing deeper wells, and the high rate of failure of the tubing in service, have awakened attention to the fact that the old, as well as any new materials offered, should be investigated before adopting a wholesale purchasing policy.

It is of great importance in conducting tubing tests that they be carried out in a proper manner, so the result may be relied upon rather than furnishing data for disputes and arguments.

The first method of conducting tests of this nature is to install 5 to 10-foot sections of full-size test tubing in the well string. In this manner a group of samples of different material may be placed together. The most attractive feature of this method is that a large number of materials may be tested at one time. It must be remembered that short-length tubing tests can be made only when it is desired to determine the corrosion resistance of the metal, as these short lengths of material will not develop data as to the resistance of the material to mechanical failures such as rod wear, split joints, or thread breaks. When short lengths are to be tested, it is important that they all be coupled together and inserted in the tubing string as near the working barrel as possible. This is due to the fact that the most rapid corrosion occurs near the bottom of the tubing string.

The second, and more satisfactory, method is to conduct larger-scale tests; so that data may be obtained on both the corrosion and mechanical resistance of the material. This means that mixed, but full strings, of tubing be set. In this connection it is advisable to adhere to three rules:

1. The tests should all be conducted in one well of known characteristics.

2. The tests should all be conducted during the same period of time.

3. The test materials must be alternated in the well so that each is equally distributed between the top and the bottom of the hole.

If these full-string tests are made, it is advisable to restrict the number of different materials in each string to three. It is, of course, necessary to have a competent person inspect each failure in order properly to identify the material; and, what is more important, the cause of failure.

The third method of testing tubing is: do not run any special string tests, but rely solely on the results obtained from the tubing actually in service. Unfortunately, it is almost never the case that all of the materials on which data are desired have been set in routine operation, and it is necessary to revert to special-part string tests as given by method No. 2.

Studies of Tubing Failures

In order to understand fully the service given by the tubing in use, a study has been made for a period of several years of all the failures which have occurred from more than a thousand wells. These data show rather definitely the types of failures which occur and their relative importance. It is believed the data have developed a rather thorough picture because of the large number of wells involved. It has been found that the typical type of tubing failure in any one field may differ widely from the typical type of failure in the other fields. By having data from a number of fields, all of the common types are encountered, and it becomes necessary to incorporate in the ideal tubing a large number of qualities.

Failures of Plain-End Tubing

Joint-end failures: At the time the study was started practically all tubing in service was plain-end tubing, whether made from wrought iron, copper-bearing of non-copper-bearing steel. In following failures from these materials it was found that more definite data were obtained by following the types of failure than the relative service given by the base metal; i.e., it has been found that each base metal is subject to the same types of failures, and in order to increase the tubing life it is necessary to eliminate the type of failure which occurs rather than attempt first to determine the ideal metal composition. The first and most important failure which occurs to plain-end tubing is in the threaded ends of the pipe. It is easily recognized that this is the weak portion of regular-end material, and field data substantiate the fact that it is the most susceptible to attack. These ends are subject to three types of failures:

First: thread breakage.

Second: corrosion through threads from inside of tubing.

Third: rod wear through threads.

The first two of these failures are of great importance. The third is important only in the older fields where crooked holes are common. In the newer fields the properly drilled wells will not give this trouble.

Excessive thread breakage is usually found in fields where heavy pumping loads exist. The Smackover (Arkansas) Pool is an example of this type. Approximately 200 wells are under observation in this field, but the majority of the failures occur in about 50 wells. During a nine-month period in 1931 these wells gave a total of 308 tubing failures. They were divided as follows:

Type of failure—	No. of failures	Average age (months)	Per cent of all failures
Thread breaks	163	38.0	52.5
Corrosion	59	51.0	19.2
Split joints	48	63.4	15.7
Collar leaks	38	40.2	12.5

These data show that slightly more than half of all the failures in this field were due to thread breakage, and new tubing should primarily be designed to eliminate this trouble.

The reasons for excessive thread breakage are not understood thoroughly. In this particular field, although it is necessary to handle large quantities of fluid, the pumping depth of the wells is relatively shallow, and the average loads are not excessive. It is thought that the excessive breakage is caused by localized (although not necessarily visible) corrosion attack coupled with high momentary shock loads due to operating the wells on long, fast strokes. Although several methods have been tried for relieving the tubing of these impact loads so as to stop the breakage, they have so far not met with very great success.

In fields where corrosion, rather than mechanical, failures predominate that portion of the tubing back of the threads is most susceptible to attack. It is difficult to overemphasize the importance of this type of failure. It can only be stated that inspection of large numbers of tubing-corrosion failures has shown that in the majority of the cases the attack proceeded from the interior of the tubing through the threads, and the body of the tubing was free from corrosion attack.

A summary was made of 1,500 tubing failures which occurred in 12 months' time. The statistics indicated that over 50 per cent of all these failures was directly attributed to either thread breakage or corrosion through the threads. In addition, it is estimated that between 50 and 75 per cent of all tubing failures is due to this cause; and, consequently tubing should be designed to resist the attack.

In addition to these field inspections, data have been obtained from short-length tubing tests which show that this particular type of failure is not accidental. The data have been too consistent for this particular locality of attack to be accidental. It is quite possible that the attack is caused at places broken in the mill scale when the tubing in threaded. To check this point specimens of scale-free tubing have been set for test. It has been found from other experiences that mill scale is a protective agent, and should be allowed to remain on sheets and pipe. It remains, however, definitely to check this point for tubing.

TABLE 1—DISTRIBUTION OF FAILURES

Tubing—	No. strings	Average age (months)	Average failure per string: Split joints	Collar leaks	Thread breaks	Corroded pipe	Total
Plain-end seamless steel	20	39.9	0.75	0.15	8.10	0.25	9.25
External-upset seamless steel	17	35.3	0.17	0.53	1.30	0.47	2.47

External-Upset Tubing

Fortunately, there is at hand a partial remedy for this extensive trouble. The remedy lies in the use of external-upset tubing. External-upset tubing is designed primarily to make the strength of tubing at the threads equal to the strength of the body of the tubing. A number of strings of this type are in use, and data have already been obtained to show that it is much less susceptible to thread breakage than is regular-end tubing.

The data were obtained from the service given by 20 strings of plain-end steel which were run from first to third class (i.e., to failure) and from the service given by 17 strings of external-upset steel which were used as replacements. The data showing the distribution of failures for the plain-end and external-upset tubing are given in Table 1.

Table 1 shows that the average regular-end steel tubing string suffered to the extent of 8.10 thread breaks during its life; while the external-upset material in the same wells had given only 1.30 thread breaks, and are still in use. At the time this comparison was made, the average age of the upset material was 4.6 months less than that of the plain-end steel. At the present time the upset material has passed the average age of the plain-end and is still in service, with very few additional failures over those accounted for in the table.

There are no data regarding the ability of upset steel to resist corrosion in that part of the tubing back of the threads. The greater thickness of the metal in the threaded section should result in a correspondingly increased life for the tubing.

Body Failures

The second, and somewhat less important types of failure are those which occur in the body of the tubing. These are divided into two types:

1. Split joints.
2. Corrosion of tubing body.

In dealing with split joints the method of tubing manufacture plays an important part. When seamless tubing is used, an almost complete freedom from split joints is obtained. If lap-welded tubing is used, a large number of split joints may be obtained. In reporting split joints the field men confuse true cases of split welds with splits from rod wear or corrosion. Either of these latter two failures may be erroneously reported as split joints. The difficulty in getting accurate reports on this type of failure from the field makes it somewhat difficult to evaluate the actual failure from opening of the weld of lap-welded material.

Extensive data regarding the action of lap-welded tubing versus seamless tubing have, however, been obtained in one field. In this field 20 strings of lap-welded tubing were run from first to third class. The average age of this tubing was 40.4 months. During this service each string suffered an average of 4.48 split joints. In the same field 20 strings of seamless tubing were run from first to third class during the same time. The average age of this tubing was 39.9 months. During this service each string of seamless material suffered an average of 0.75 split joints

(Continued on Page 64)

*Before third mid-year meeting, American Petroleum Institute, Tulsa, May 19.
Author's title is "Corrosion of Oil Well Tubing."

Use of Trichlorethylene in Centrifugal Dewaxing

(Continued from Page 52)

draft exhaust fans should be used, as the solvent vapors are heavier than air.

Operating Costs

The actual cost of building a plant for using this process is entirely dependent upon the stock to be handled, geographical location, as well as upon the chilling facilities provided, i.e., batch or continuous. In Table 3 will be found a comparison of the utility requirements for two typical plants of approximately 400 bbls. per day of undewaxed oil charged. In the one case the dilution is low, as the stock is of low wax content (2 to 3 per cent), and the solvent-oil mixture is only chilled to 0° F.; whereas in the second instance with a 20 per cent wax concentration there is a higher solvent dilution, and the solution is chilled to a temperature of —30° F. Continuous chilling is assumed in both plants, and in the first this is accomplished by means of water, dewaxed solution, and brine; while, in the second plant water, cold solution, and direct expansion of ammonia are used. The approximate cost figures given in the table include the cost of solvent and engineering.

TABLE 3

Oil charge to plant, gal. per hr.	100	100
Trichlorethylene-oil dilution	45:55	60:40
Water, gals. per min.	20	40
Exhaust steam, lbs. per hr.	270	390
Live steam, lbs. per hr.	60	90
Power, kilowatts	8	19
Solvent loss, per cent by volume on oil charge	0.6	0.9
Approximate plant cost, dollars per 100 gal. per hr.	$20,000–$35,000	$55,000–$60,000

It should be easily possible to operate the dewaxing and solvent-recovery units with a total of three men—one to operate the dewaxing machines, one for pumps and refrigeration, and the third for the still itself.

The data given in Table 3 should be ample to enable anyone interested in the process to calculate the operating costs by his own particular method, and from figures so obtained it may then be readily determined whether the process would appear to have any advantages over the dewaxing methods which might be currently used. On the basis of the data given in Table 3 the operating cost per 100 gallons for the two plants should work out to $1.40 to $1.50 per 100 for the low wax content stock, and $2.10 to $2.20 per 100 for the high wax content oil.

Design and Operation of Small Cracking Unit

(Continued from Page 53)

level control. The various transfer lines leading to and from the evaporator and the tower itself are adibatically wound.

The flash tower, 8, is of similar construction to the evaporator. The bottoms of the towers, 7 and 8, have removable plates made tight by means of tongue and

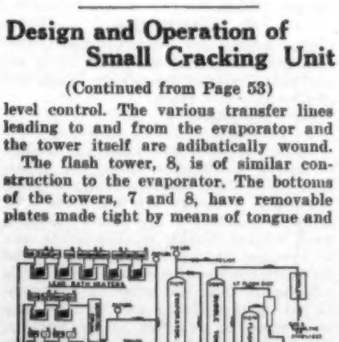


Figure 2. Operating flow diagram

groove companion flanges, using a copper gasket. The bottom flange contains a lead cell, equipped with a thermowell to permit heating the base to a known skin temperature.

The overhead vapors from the evaporator, 7, and from the flash tower, 8, pass through towers serving as partial condensers (9 and 10). These towers have closed coil reflux, and are packed with Ascoloy-Lessig rings. These fractionators permit the separation of clean and dirty recycle stocks, and in certain cases are also used for fresh feed fractionating to produce distilled light colored furnace charges. Stocks suitable for severe or mild cracking conditions are thus obtained.

The bubble tower, 11, is also a packed column with reflux control similar to that of the partial condensers. From the top of the bubble tower, gas and gasoline, the latter of desired endpoint, pass to the condenser, 12, and thence to the gasoline receiver, 13, and stabilizer, 14. The wet gas passes from the top of the gasoline receiver into the bottom of the stabilizer, which is a refrigerated column. The condensibles from the bottom of the refrigerated column trap back into the gasoline receiver continuously, and are partially reboiled—setting up reflux in the refrigerated column. Dry

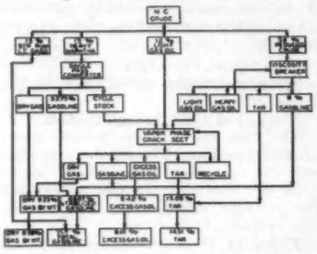


Figure 3. Concurrently processing fractions of Mid-Continent crude

gas issues from the top of the column and passes to a gas meter, 15. Control of the refrigerated column and reboiling temperature permits the production of stabilized gasoline of the desired Reid vapor pressure.

The bottoms from the two partial condensers and bubble tower flow to the respective charge tanks; and the pumping rates from these tanks and either the charge rate or cracking conditions are so adjusted as to maintain constant levels.

All operations upon the pilot plants are calculated for a weight balance upon a material input basis, the charges and products being accurately determined. In this manner losses comparable to those in a commercial operation are included. The average run is usually within 2 to 3 per cent of the theoretical. Initial "come-up" times of from 12 to 24 hours, wherein recycle and steam gravities are changing, are not included in the yield calculations, which only cover periods when the system is operating at uniform conditions.

To illustrate a "combination" cracking operation and typical information available from such a pilot plant, the following results obtained when processing a Mid-Continent crude are appended.

The crude as received had the following distillation:

A.P.I. gravity	35.6
Distillation, °F.:	
Initial boiling point	192
5 per cent point	250
10 per cent point	280
20 per cent point	348
30 per cent point	411
40 per cent point	482
50 per cent point	562
60 per cent point	629
70 per cent point	662
80 per cent point	690
	cracked

It was pipe stilled in auxiliary equipment to prepare the various charges for the cracking unit, and yields from this preliminary operation were as follows:

	Per cent
Light straightrun gasoline	15.0
Heavy naphtha	15.0
Light gas oil	12.0
Reduced crude	58.0
Total	100.0

The light straightrun gasoline from the above operation had an octane number of 62, and was reserved for final gasoline blending with the gasoline from the cracking unit; while the heavy naphtha, light gas oil, and reduced crude were charged to the unit in proportion to their yields from the crude. The inspections of these stocks are tabulated in Table 1.

TABLE 1—INSPECTIONS OF PILOT PLANT CHARGES

	Light straight-run gasoline	Heavy naphtha	Light gas oil	Reduced crude
Crude, per cent	0–5	15–30	30–42	42–100
Gravity, A.P.I.	69.2	47.9	40.9	35.5
Distillation, °F.:				
I.b.p.	112	314	401	490
20%	165	335	429	604
50%	199	354	448	686
90%	250	398	494	(*)
Endpoint	290	430	537	
Recovery, %	97	98	98	
Octane No. (CFR)	62			

*Cracked.

The operating flow diagram is shown schematically in Figure 2, and the operating temperatures and pressures in Table 2. A tabulation of the cracks per pass of the various zones, the yields and weight balance, is shown in Table 3.

To visualize more readily the continuity of operations, Figure 3 shows processing from the crude to the products. Table 4 includes inspections of products.

TABLE 2—OPERATING CONDITIONS

Pressures—	Lbs.
Viscosity breaker	250
Vapor phase cracking coils	250
Heavy naphtha converter	750
Evaporator	150
Temperatures (oil outlet)—	°F.
Viscosity breaker:	
Sec. 1 (not heated)	350
Sec. 2	800
Sec. 3	868
Sec. 4	868
Sec. 5	868
Vapor phase section:	
Sec. 1	926
Sec. 2	932
Soaking drum outlet	904
Heavy naphtha converter:	
Sec. 1	962
Sec. 2	962
Evaporator:	
Top	710
Middle	757
Bottom	788
Flash tower:	
Top	710
Bottom	770
Bubble tower:	
Top	260

TABLE 3—YIELDS

(Based on pilot plant charge)

	Pct.
Stabilized cracked gasoline	66.67
Dry gas, by weight	9.25
Tar	17.08
Excess gas oil*	9.42
Weight balance	97.1
Octane numbers (C.F.R.)—	(No.)
Viscosity breaker gasoline	73.0
Heavy naphtha converter gasoline	74.5
Vapor phase cracking section gasoline	76.5
Stabilized cracked gasoline	75.5
Total stabilized gasoline	74.0

(Based on crude)

	Pct.
Total stabilized gasoline	71.70
Dry gas, by weight	8.08
Tar	14.51
Excess gas oil*	8.01

*Part of the excess gas oil would be used for diluting the tar to bunker "C" viscosity, or for sale directly, or would be returned to the unit for cracking.

TABLE 4—INSPECTION OF PRODUCTS

	Stabilized cracked gasoline	Total stabilized gasoline*	Bubble tower bottoms†	Tar
Gravity, A.P.I.	59.0	60.6	28.8	3.0
Distillation, °F.:				
I.b.p.	35	88	375	...
20%	168	163	442	...
50%	265	240	477	...
90%	358	350	604	...
Endpoint	378	376	666	...
Rec., %	97.5	98	97.5	...
Octane No. (C.F.R.)	75.5	74	...	...

*Blend of cracked and light straightrun gasoline.

†Recycle to vapor phase furnace.

Laboratory Control of Making Wax Distillate

(Continued from Page 50)

form upon the plates in the more concentrated solutions.

Figure 7 gives the crystal structure of six commercial pressing stocks from various Mid-Continent refineries. The physical tests on these distillates are given in Table 2. Pressing stock No. 1 (648 endpoint) shows excellent large-plate crystals, considering the high endpoint. This distillate is usually diluted to a viscosity of 52 to 55 seconds at 100° F. for pressing (operation 8, Table 1). Pressing stock No. 2 (632 endpoint), which shows excellent crystal structure, refers to operation 6, in Table 1.

Pressing stock No. 3 (637 endpoint) is diluted to a viscosity of 55 to 60 seconds at 100° F. for pressing (operation 7, Table 1), and gives a good filtering rate with a high neutral yield. Pressing stock No. 4 (643 endpoint) is a relatively low wax-content distillate, showing fair crystal formation and giving good press capacity and neutral yields (operation 4, Table 1).

Stock No. 5 (625 endpoint) is of the mixed-crystal type showing poor fractionation. The crystal structure shows a scattering of fair sized, but poorly formed plates with a background (not well shown in the picture) of minute plates. This distillate (No. 5, Table 1) gives low pressing rates and low neutral yields.

The last distillate is a poorly fractionated product, giving very small, 0.01 to 0.05 mm., crystals. The distillate (No. 2, Table 1) is pressed straight for high cold test oils, and is diluted to a viscosity of from 64 to 68 seconds at 100° F. for low temperature pressing (No. 3, Table 1). The pressing stock and neutral yields are very low.

The actual control procedure used at Ponca City is to examine a sample of pressing stock from each finished run tank and from the still streams each morning for crystal structure. The quality of the crystal form is reported to the operating department by number. No. 1 represents a very good large-plate structure, and No. 10 in the scale a very poor product. In unusual cases, such as exceptionally poor distillates or a sudden change in crystal form, microphotographs are made; and prints are sent to both the distillation and wax plant departments. Figure 3 gives an example of a series of microphotographs which might be used for control purposes. The grades would be numbered 1 to 6 in accordance with crystal size. Additional grades could be added to either end, depending upon the probable variation to be found in a given operation.

BIBLIOGRAPHY

[1]F. W. Padgett, D. G. Hefley and A. Henriksen, "Wax Crystallization," Ind. Eng. Chem., 18, 832-5 (1926).

[2]C. C. Buchler and G. D. Graves, "The Petroleum Waxes," Ind. Eng. Chem., 19, 718-24 (1927).

[3]S. W. Ferris, H. C. Cowles, Jr., and L. M. Henderson, "Composition of Paraffin Wax," Ind. Eng. Chem., 21, 1,090-2 (1929).

[4]S. W. Ferris, H. C. Cowles, Jr., and L. M. Henderson, "Composition and Crystal Form of the Petroleum Waxes," Ind. Eng. Chem., 23, 681-8 (1931).

[5]George L. Clark and Howard A. Smith, "X-ray Diffraction Study of Fractionated Paraffin Waxes," Ind. Eng. Chem., 23, 697-701, (1931).

[6]E. Katz, "The Crystallization of Petroleum Wax," Inst. Petroleum Tech., p. 870-88 (Dec. 1930).

[7]E. Katz, "The Crystallization of Petroleum Wax, Part 2," Inst. Petroleum Tech., p. 37-52 (Jan. 1932).

[8]G. A. Beiswenger and William C. Child, "An Improved Method for Crude Analysis," The Petroleum Engr., p. 200 (April, 1929).

Range Oil Burners Offer New Market for Industry

(Continued from Page 56)

ported that 700 customers switched to oil; another with 42,000 meters stated that 7,000 of its customers were using oil for cooking.

These facts are significant.

Periods of Sales Activity

Climatic conditions in the New England area have to a certain extent in the past determined the peak selling months for range burners. The period of activity begins in the month of August; activity increases in September, is apt to double the September totals during the month of October, and then tapers off rapidly by the end of November. It has been the experience that the months of April and May often produce a demand for burners which is generally attributed to the fact that the supply of hard fuels has become exhausted, and the range burner provides a convenient means of carrying through for the relatively small balance of the normal heating season.

It is our opinion, however, that the sales curve of range burners will be con-

siderably changed by the advent of complete units, such as the circulating and radiating type space heaters, as well as various forms of storage water heaters. Equipment of this character should have a more steady market, and in the course of time its effect on the selling periods is bound to be beneficial.

Comparative Operating Costs

Table 2 furnishes a basis by means of which general comparisons can be made indicating that the combination of range oil burners and range oil can compete with the principal competitive fuels. This comparison is based on five different prices for range oil, anthracite coal, manufactured gas, and electricity.

TABLE 2—COMPARISON OF HOT WATER HEATING COSTS—NUMBER OF GALLONS OF HOT WATER FOR $1

		Gallons of water
Range oil or kerosene	$0.08 per gal.	1,910
	$0.10 per gal.	1,528
	$0.12 per gal.	1,272
	$0.14 per gal.	1,090
	$0.16 per gal.	955
Anthracite coal	$8 per ton	1,625
	$10 per ton	1,300
	$12 per ton	1,082
	$14 per ton	924
	$16 per ton	813
Manufactured gas	$0.50 per M ft.	1,170
	$0.75 per M ft.	844
	$1.00 per M ft.	633
	$1.25 per M ft.	506
	$1.50 per M ft.	421
Electricity	$0.02 per kw hr.	243
	$0.04 per kw hr.	121
	$0.06 per kw hr.	81
	$0.08 per kw hr.	60
	$0.10 per kw hr.	49

In order to make a comparison between oil and any other fuel it is necessary to know the fuel prices. In as much as there is a very wide range of fuel prices throughout the country, it is necessary to show the prices for each fuel in a separate group. The fuel prices for any section of the country can then be compared.

Figures in Table 2 represent tests conducted on a storage water heater which is operated by a "builtin" range burner, and illustrate the number of gallons of hot water raised in temperature from 60° F. to 140° F. that can be obtained with $1 worth of the different fuels at prices shown.

The basic data for the figures in Table 2 are:

Electricity, 95 per cent efficiency. (3,412 B.t.u. per kwh. standard immersion heater.)

Manufactured gas, 65 per cent efficiency. (600 B.t.u. per cubic foot standard side-arm heater.)

Range oil, 75 per cent efficiency. (136,000 B.t.u. per gallon storage water heater, with builtin range burner.)

Coal (anthracite), 35 per cent efficiency. (12,000 B.t.u. per pound standard type coal fired water heater.)

Summary

From the foregoing we can draw the following conclusions as being of particular significance to the oil industry:

1. The volume of oil business developed in the past eight years through the influence of range burners in the New England states alone, where approximately 90 per cent of all the range burners produced to date have been installed, can logically be expected to repeat itself quite generally in various sections of the entire country.

2. The marketing of range burners in territories outside of New England for the most part is still in the pioneering stage, due to the unfamiliarity of the public in general with this important new development.

3. The fact that the majority of this large New England range oil business up to the present time is in the hands of oil jobbers, handling tank car lots purchased from the major companies, affords an opportunity to those who can visualize the possibilities in territories outside of New England to profit by this experience and plan for the development of distribution facilities to keep pace with the growth of range burner distribution in your respective territories.

4. The results obtained recently in the case of one or two large companies which have entered the field of selling range burners direct to the consumer, with a plan which is predicated on furnishing the oil requirements of the customer, should be given serious consideration. This plan merits a profit from the sale of the burner as well as the possibility of controlling an important share of the oil business thus created.

5. Finally, we wish to emphasize the desirability of directing the attention of the oil industry to the further improvement of fuels for use in this type of burner. As has been previously mentioned, oil companies operating in territories where the range oil burner can be logically expected to assume importance in terms of volume distribution—where good range oil is not now available—and who prepare to market oil meeting these requirements, will unquestionably obtain liberal reward for their efforts.

Jet Pump Principles Promise Good Results

(Continued from Page 57)

Viscosity—70 sec. Saybolt Universal.
Total lift—2,050 ft.
Submergence pressure—50 lbs. per sq. in.

On the basis of experiments on water-jet pumps, the following coefficients were selected:

$K_t=0.12$, $K_d=0.20$, $K_j=0.15$, $K_s=0.10$.

Assuming $R=0.32$, Equation 2 gives $H=0.614$ and $M=0.325$ at a maximum efficienecy of 20 per cent. The necessary dimensions and quantities are:

Driving quantity = 13.5 gals. per min.
Diameter of nozzle = 0.10 in.
Velocity of driving jet = 556 ft. per sec.
Driving pressure at surface = 1,353 lbs. per sq. in.
Necessary submergence = 41.8 lbs. per sq. in.
Reynolds No. for nozzle = 25,800

The velocity of the driving jet in this example is relatively high, and the diameter of the nozzle small. The size of the nozzle could be increased, and the velocity of the jet decreased, for the same production by using two jet pumps in series; but in doing this, the Reynolds number will be decreased to about 22,000, which is probably satisfactory. For a certain area ratio, rate of production, and viscosity, the Reynolds number is proportional to the fourth root of the pressure at the base of the nozzle.

Another feature to be noted is the large submergence pressure necessary to avoid "cavitation" in the suction stream at the point of highest velocity. Computation of this submergence is a very important part of the design of a jet pump, since inadequate submergence may reduce the production far below the design value. The procedure is to apply Equation 2 and obtain the dimensions of the nozzle and throat and then compute, from the ordinary flow equations, the submergence necessary to force the pumped quantity up through the suction line.

Conclusions

The example cited shows very clearly the principal disadvantages of the jet pump as applied to petroleum production. In this case, the design conditions involve a low lift, average viscosity, and medium rate of production; and yet the velocity of the driving jet is so high that erosion of the nozzle and throat may occur unless special provisions are made to prevent it. The adverse effects of the high velocity would be accentuated in wells producing large quantities of sand. Another harmful effect of the high velocities is to increase emulsification. Directly related to the high velocities are the very small dimensions which introduce difficulties in machining and alignment as well as in operation.

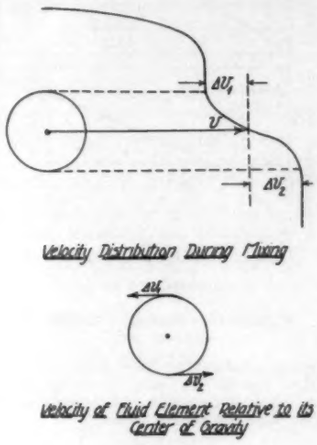


Figure 3

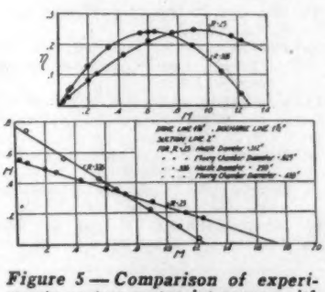


Figure 5 — Comparison of experiments on two water jet pumps with Equation 2

Conditions favorable for the use of the jet pump in oil production are low lifts and large rates of production, and these can be approached by using jet pumps in series. Low viscosity is also favorable to the operation of the jet pump, and it seems doubtful whether the more viscous crude oils can be handled by this method under any circumstances.

This analysis has been based entirely upon experience with water-jet pumps, and the authors neither wish to advocate nor unduly discourage the application of this type of pump to petroleum production. It cannot be regarded as a universally suitable method, and yet there are special conditions for which it appears to be well suited if extrapolation from experience with water-jet pumps is justified. Theory indicates that such extrapolation is permissible, but only operation in the field can give complete assurance.

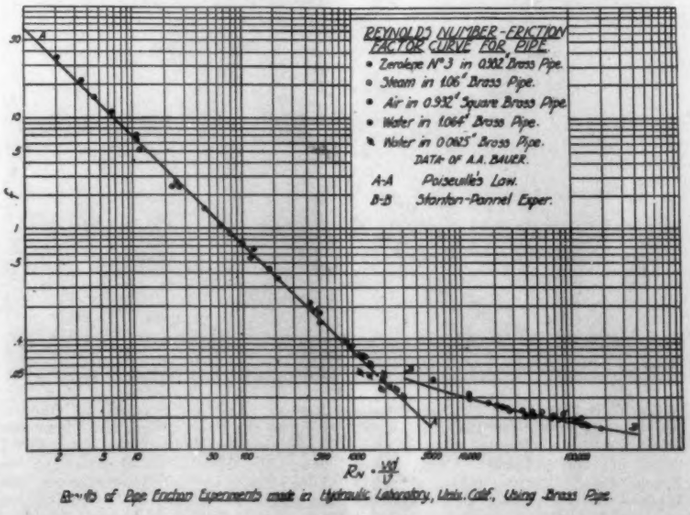

REYNOLDS NUMBER-FRICTION FACTOR CURVE FOR PIPE.
Zerolene N°3 in 0.302' Brass Pipe.
Steam in 1.06' Brass Pipe.
Air in 0.932' Square Brass Pipe.
Water in 1.064' Brass Pipe.
Water in 0.0625' Brass Pipe.
DATA OF A.A. BAUER.
A-A Poiseuille's Law.
B-B Stanton-Pannel Exper.
$R_N = \frac{Vd}{\nu}$

Figure 4

Permeability of the Sand Influences Area of Wells

(Continued from Page 60)

are shown. A curve is given for each value of the relative time:

$$\frac{K\theta}{c\phi a^2}$$

These curves follow quite closely the curves derived for steady flow, the equation for which has been presented in a number of previous articles.[6, 7] This steady flow equation is:

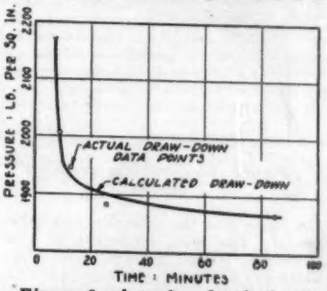


Figure 8—Actual and calculated draw-down curves

$$2.3 \log_{10} \frac{b'}{a} = \frac{2\pi KH(P_a - P_w)}{q_a}$$

The term b' is defined as that value of the radius which, when substituted in this equation, gives the same production rate and approximately the same pressure gradient as exist under the actual conditions of unsteady flow. This term is referred to as the drainage radius; but should not be considered to mean the distance to which the well has completely drained the reservoir, but rather the distance from which oil is flowing to the well in appreciable quantities.

The term b' varies with the relative time:

$$\frac{K\theta}{c\phi a^2}$$

and a curve showing this relationship is given in Figure 11. This relationship is purely empirical, but may be used in calculating the pressure-gradient curve. The apparent drainage radius, b', is about 60 per cent as great as the distance from which the well drains oil, as indicated by the equations of unsteady flow.

The drainage radius calculated by this method varies nearly as the square root of the ratio:

$$\frac{K\theta}{\phi c a^2}$$

Because of the probable error in the estimation of c, ϕ, and a, and because of the lack of uniformity in actual producing sands, the actual drainage radius cannot be calculated with great accuracy; but it can be estimated roughly, and the relative size of the drainage radius of sev-

eral wells can be determined. Figure 12 shows how the drainage radius and drainage area of the well used as an example in the foregoing discussion varies with time.

It is interesting to observe that the drainage radius depends on time, but not

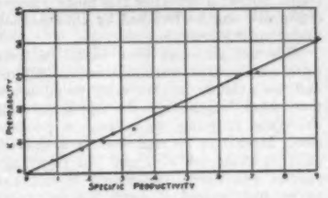


Figure 9—Permeability vs. specific productivity

on the rate of production. Thus, it is evident that a well produced slowly will drain a much larger area than one produced rapidly. Although the influence of this condition cannot be evaluated quantitatively at the present time, it points to the conclusion that the recoverable oil can be obtained with wide well spacing in a field whose rate of with-

Conclusions

In order to understand properly the conditions in oil-producing reservoirs, a knowledge of the physical properties of

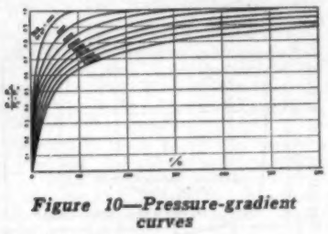


Figure 10—Pressure-gradient curves

the fluids and the reservoir rock is essential. The most important of these properties is the average permeability which can be determined from field tests.

Permeability greatly influences the ultimate recovery in oil reservoirs, and is of primary importance in the selection of a proper well-spacing program. With adequate knowledge of the effect of such important factors as this, and with reliable means for determining these quantities, the problems of evaluation, economical development, and proper control of oil-producing properties can be solved

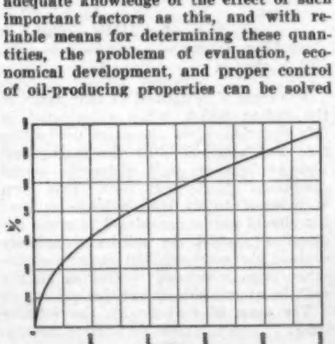


Figure 11—Relation of time to drainage radius

with greater precision. It seems that the elimination of guesswork in such problems would be of utmost value to the producer whose economic survival depends upon obtaining oil as cheaply as possible.

One of the most interesting conclusions to be reached from this work is that well spacing much wider than that used in the past can be used, and that the number of wells required to drain a field adequately can be reduced if the rate of production from the field is kept at a low figure. However, it is unfortunate that in most fields, at present, factors other than proper engineering considerations govern the well spacing; and, as long as this condition prevails, the industry must continue to spend money in unnecessary development.

Acknowledgment

The authors are indebted to W. K. Lewis, of the Department of Chemical Engineering, Massachusetts Institute of Technology, for the valuable suggestions which he has contributed during the course of this work. H. D. Wilde, Jr., in charge of production research at the Humble Oil & Refining Co., has directed the work, and has assisted materially in

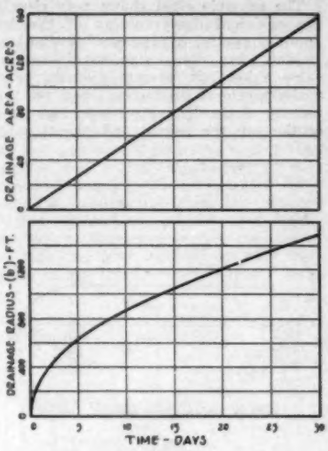


Figure 12—Drainage radius of typical well

the preparation of this paper. F. M. Black and W. R. Veale, II, of the Humble Oil & Refining Co., have secured the field data presented herein.

Appendix

The mathematical analysis of the drainage of the uniform reservoir will be published elsewhere by William Hurst.

Nomenclature

P_R Sut-in reservoir pressure, lbs. per sq. in.

P_W Pressure at face of producing sand, lbs. per sq. in.

q_R Production rate, bbls. per day (oil and gas mixture, corrected to volume at P_R).

Q_R Cumulative production, bbls. (oil and gas mixture, corrected to volume at P_R).

ρ_R Density of oil and gas mixture at P_R, lbs. per cu. ft.

ρ_W Density of oil and gas mixture at P_W, lbs. per cu. ft.

K Permeability, cu. ft. per day per sq. ft. per lb. per sq. ft. per ft.

C Compressibility of oil and gas mixture, cu. ft. per cu. ft. per lb. per sq. ft.

ϕ Porosity, fraction.

θ Time, days.

a Radius of well bore, ft.

b Radius of outer limit of a finite cylindrical reservoir, ft.

b' Apparent drainage radius of well, as defined in text, ft.

Bibliography

[1]Wilde and Moore, "Hydrodynamics of Reservoir Drainage and Its Relation to Well Spacing," Proc. Thirteenth Annual Meeting, Amer. Pet. Inst., Sec. 4, p. 83-90.

[2]Wilde and Moore, "A Method for Determining Production Allowances in Prorated Fields," Oil Weekly, 61, No. 12, 26 (1931).

[3]Pettke and Copeland, "Permeability Studies of Pennsylvania Oil Sands," Trans. Am. Inst. Mining Met. Eng. (Pet. Div.), p. 438 (1932).

[4]C. V. Millikan, "Geological Application of Bottom Hole Pressures," Bull. Am. Assoc. Petroleum Geol., 16, No. 8, 891-906 (1932).

[5]D. G. Hawthorne, "Applying Subsurface Pressure Determinations to the Problems of Oil Well Production," The Oil and Gas Journal, 31, No. 26, 36-44 (1932).

[6]Schlichter, "Theoretical Investigation of the Motion of Ground Water," U. S. Geo. Survey, Nineteenth Annual Report, 1897-8.

[7]Muskat and Botset, "Flow of Gas Through Porous Material," Physics, 1, No. 1, 27 (1931).

[8]Carslaw, "The Conduction of Heat," The Macmillan Co., New York, Chap. 7, p. 113 (1921).

[9]Lamb, Hydrodynamics, Cambridge Univ. Press, Boston, Chap. 1, p. 6 (1916).

[10]Watson, Theory of Bessel Functions, Cambridge Univ. Press, Boston (1922).

Corrosion of Well Tubing a Vicious Form of Attack

(Continued from Page 61)

per string. The reduction in split joints was due entirely to the difference in manufacture.

Resume of Plain-End Tubing Failures

The data which has been collected in plain-end tubing failures indicate that the majority of them occur in the ends of the joint. It has been determined that the use of external-upset material largely reduces these failures. Body failures are about equally distributed between split joints and corrosion failures. Body corrosion failures can be reduced only by using protected tubing, while split joints can be overcome largely by using seamless tubing. External-upset seamless tubing combines these two beneficial features, and is being used to eliminate former troubles.

Failures of External-Upset Tubing

As a consequence of the admirable features of external-upset seamless tubing, a good many strings have been set, and are in service at the present time. Unfortunately, although these installations have largely stopped the previous types of failures, one entirely new type has been substituted, this being accelerated corrosion in the upset zone. This particular type of failure has been largely confined to upset tubing used in the Smackover oil pool, but is now being found on upset tubing set in the Gulf Coast fields. It is apparent that upset tubing will be subject to this localized attack in any field which is even moderately corrosive. In non-corrosive fields the attack will probably not develop; but, in as much as tubing is shifted from field to field, it is not safe to buy upset tubing for a non-corrosive field and expect it to remain in that place. This corrosion is manifest through the development of a deeply-pitted circular ring opposite the fillet of the upset zone, and on the interior of the tubing.

The seriousness of this type of failure is realized from the fact that it develops in 18 months in wells which were not corrosive to regular-end tubing. Fortunately, the solution of the problem has been found. Apparently, the corrosion is due to the difference in the grain structure and in the condition of strain between the normal and reheated zones of the upset tubing. Fully normalizing the tubing after upsetting removes these differences, and prevents the accelerated corrosion from occurring. Test strings of fully normalized upset tubing tested in wells which previously gave failures to unnormalized tubing have served longer without failure than did the unnormalized material. It is believed that upset tubing should not be purchased unless it is fully normalized.

Protective Coatings for Tubing

The use of zinc has been the most popular and useful type of protective coating for oil well tubing. Experiments are being conducted with other hot-dipped coatings, but it is not probable that they will displace galvanized coatings. It is desired to know what superiority galvanized tubing possesses over black tubing. To answer this question approximately 1,200 joints of galvanized wrought-iron tubing were set in 1929. After one to one and one-half years of service 470 of these joints were taken from temporarily abandoned wells. The tubing was inspected, and it was found that on 50 per cent of the joints the galvanizing on that part of the tubing back of the threads was gone. This left the tubing no more corrosive-resistant than the base metal. Of the 1,200 joints, failures have occurred to 260 joints. It is a remarkable fact that every one of these failures occurred on threaded ends of the tubing.

The service life of one string of discarded tubing was but little better than that of the previous string of black tubing. The remaining joints (approximately 500) of galvanized tubing are still in service. These strings are mixed by having one thribble of steel next to the working barrel followed by 70 joints of galvanized wrought iron and then 40 joints of copper-bearing steel. To date there have been insufficient failures from either material to justify any comparison of life between the galvanized wrought iron and the steel.

Summary and Conclusions

Records are kept of the failures which occur to tubing in service in a large number of wells. The results of the records show that the most common failures occur in the joint ends either from corrosion back of the threads, thread breaks, or split joints. Corrosion attack of the threads is a particularly vicious form of attack, and is obtained both on plain-end tubing and on short test sections. Its relation to mill scale is being studied. Joint-end failures and split welds can largely be overcome by the use of external-upset seamless tubing—although for best results and surety of freedom of attack from ring-worm corrosion this material should be fully normalized.

Galvanized tubing has been found to suffer from end-joint failure, and the best results will probably come from using galvanized external-upset seamless steel where extremely corrosive conditions prevail.

Equipment Manufacturer Interested in Aviation

Left to right: Mayor Fickling of Long Beach, Calif.; Wallace Beery, M.-G.-M. star, and W. R. (Frosty) Martin, president of Martin-Decker Corp., Long Beach, Calif. Picture taken alongside Wallace Beery's private plane. On this occasion Mr. Beery was commissioned lieutenant commander in the U. S. Naval Reserve, Aviation Section, by Admiral Senn of the Pacific Fleet and Lieutenant Koger, commandant of the Long Beach base. Mr. Martin, as chairman of the Long Beach Aviation Commission, was an active participant in the ceremonies, which were filmed and sound recorded by the news reel services.

Southwestern Noble County, Oklahoma, Given Added Importance by New Community Well

By W. A. SPINNEY
Staff Correspondent, Oklahoma Fields

The fourth producing well on the unitized block in the Wentz Pool, in Noble County, extended the production three quarters of a mile to the southwest. The well was the Lucien Consolidated Community's No. 1 E. Farr, C NE NE Section 19-20-2w. It blew in after cleaning out a bridge, making 140 bbls. of oil in 15 minutes. The gas was estimated at 10,000,000 feet a day. It was shut in, and opened the next day, and then made 45 bbls. in 15 minutes, after which it bridged again. It will be cleaned out and drilled a few feet deeper before making a potential test. The oil was found in the Wilcox sand at 5,118-22½ feet.

This well is one mile south of the same company's No. 1 Whitten, C SW SW Section 7-20-2w, which is shut in after showing for an estimated 10,000 bbls. a day from the Wilcox sand.

Ramsay Petroleum Co., Indian Territory Illuminating Oil Co., and Continental Oil Co.'s No. 1, C SW SE Section 32-22-14w, Major County, wildcat, is a location. This test is south of the bend in the Cimarron River and is about 50 miles from the nearest oil production in the state. It is located on a large block of leases held jointly by the Indian Territory Illuminating Oil Co. and Continental Oil Co.

The daily average production of the principal areas in the State for the week ending May 20, was as follows:

Pool—	Bbls.
Bowlegs	10,905
Bristow-Slick	10,500
Burbank	10,000
Carr City	8,080
Earlsboro	11,710
East Earlsboro	16,070
South Earlsboro	1,620
Little River	16,130
East Little River	1,175
Oklahoma City	167,115
Seminole City	12,200
Tatums	2,950
Total	269,455
Others	198,095
Total State	467,550

Wilcox Sand in Keokuk Falls Area

Carter Oil Co.'s No. 1 Canard, CSL SW SE Section 35-11-6, in the Keokuk Falls area of Seminole County, found a showing of oil in the Wilcox sand at 4,398-4,403 feet after a core had been taken of the sand. The crew was landing 7-inch casing at 4,340 feet and standard tools will be rigged up, and the well drilled deeper in a few days. This is the first Wilcox sand showing found in this area. It is 3 miles north of the nearest Wilcox sand production in the Searight Pool. The discovery well in the Keokuk Falls area was the same company's No. 1 in Section 2-10-6, which was completed in the Misener sand with an initial of 2,000 bbls. a day, and is the south offset to the Wilcox sand well.

Demand for Crude

Attempts of the purchasing companies to increase their nominations in the Oklahoma City Field have been delayed temporarily by the Corporation Commission. Petitions for increased allowables for the month of May were unsuccessful at the May 16 hearing of the commission, which continued the cases until May 24.

Sinclair Prairie Oil Marketing Co. was seeking to increase its daily nominations 60,000 bbls. The Petroleum Pipe Line Co. wanted an increase of 7,500 bbls. and the two others that joined, but did not present petitions, were Champlin Refining Co. and H. F. Wilcox Oil & Gas Co.

Opponents of the increases led by S. W. Hayes, attorney for the Slick interests, asked for a continuance so that additional testimony could be produced, which it was stated, would show that there is not that much purchaseable oil available in the Oklahoma City Field; that the companies desire to fill empty storage and that such an order would lead to physical waste and economic waste.

Chairman Paul Walker, of the commission, related that the commission had been approached by various producers and agencies asking that further restrictions be placed on production until the running of crude oil to storage be stopped. "We cannot have the producers coming in and asking for more oil to fill their storage tanks and then when the tanks are full to have them come back demanding a decrease in allowables," said Mr. Walker.

Commissioner Hughes stated that he wanted to know if this was a legitimate demand and where the oil is coming from and where it is going. He also suggested that State Umpire Carl Giles be instructed to survey the State and determine the amount of storage facilities and the amount of oil now in storage.

H. A. Meyer, vice president of the Sinclair Prairie Oil Marketing Co., testified that the additional oil asked for was needed for refinery demands of subsidiary companies and that the oil would not be sent to storage. He said that in April the company lacked 151,000 bbls. of meeting its nominations for the Oklahoma City Field, part of which was due to shutting down the field. The oil marketing company sells oil to the Sinclair Refining Co., the Canfield Oil Co., the Stanolind Crude Oil Purchasing Co. and the Carbide & Carbon Co. of West Virginia. He stated that oil taken under the new nominations would not be sent to Texas, nor any Texas oil shipped into Oklahoma. Crude oil from the Oklahoma City Field would be immediately sent to Coffeyville and Kansas City, Kans., and East Chicago, Ind., to meet refinery demands. Purchases in Texas by the company have been increased in accordance with the increase in allowables there.

S. W. Hayes asked that the Sinclair Prairie Co. be requested to show the number of tank farms owned by the company, the capacity of the tanks, the amount of oil in storage and the available space. This was objected to by Horace McKeever, attorney for the Champlin Refining Co.

Later Mr. Hayes asked that the distribution of oil to the various Sinclair companies since the first of the year be shown, to determine whether any went to storage and in what quantity. He also requested that the company show its connections in Oklahoma City Field at the present time and what quantity of oil has been taken from all leases since the first of the year.

Commissioners Walker and Hughes upheld Hayes in his demand for these exhibits.

Wildcat Operations in Oklahoma

Northern Oklahoma

ALFALFA COUNTY

Company, farm and location— Remarks:

Acre et al's No. 1 Acre, C SW NE Sec. 14-24-11w..... O.W.D.D.; T.D. 5,502 ft; C.O.

BECKHAM COUNTY

Pattee Royalty Co.'s No. 1 Goose Tree, SW SE SW SE Sec. 32-10-23w ..... Drlg. 2,210 ft.

CADDO COUNTY

Denver P. & R. Co.'s No. 1 Noe, NW SW SW Sec. 34-10-10w ..... Drlg. 8,500 ft.
W. L. Miller's No. 1 Gardner, SE SW Sec. 26-6-10w.... Rig.

COAL COUNTY

Dodd & Burton's No. 1 Grigsby, NW SE NE Sec. 35-1-8.. Oil show 1,858-67 ft; C.O.
Funk & Russell's No. 1 Miller, SE NE Sec. 10-2-8 ..... Drlg. 2,835 ft.

GARFIELD COUNTY

Continental Oil Co.'s No. 1 Thompson, NW SW SW Sec. 7-24-4w ..... Drlg. 5,915 ft.

HUGHES COUNTY

Dixie-Lee Oil Co.'s No. 1 Taylor, C NW Sec. 27-5-10.... Drlg. 125 ft.
Pioneer Pet. Co.'s No. 1 Brock, SE cor. Sec. 26-5-11 ..... Rig.
Redwine et al's No. 1 Badger, C N half SW SW Sec. 4-5-11 ..... Drlg. 300 ft.

KAY COUNTY

Blauner et al's No. 1 Maple, NE NW SE Sec. 20-27-4.... Drlg. 660 ft.

KIOWA COUNTY

Christian's No. 1 Jones, NE NW Sec. 6-7-18w ..... Drlg. 1,702 ft.
McWhirter et al's No. 1 Vanderaeck, NE NW Sec. 3-7-19w (O.W.D.D.) ..... C.O. 2,035 ft.

LOGAN COUNTY

Gypsy Oil Co.'s No. 1 McConnell, C NE SE Sec. 28-17-4w. Drlg. 4,150 ft.
Shell Pet. Corp.'s No. 1 Faulkner, C SE NW Sec. 11-15-4w. Drlg. 5,212 ft.

MURRAY COUNTY

A. E. Harden's No. 1 Sadler, NE Sec. 19-1-2..... Rig.

NOBLE COUNTY

Shell Pet. Corp. 's No. 1 Farr, C NE NE, Sec. 19-20-2w.. Wilcox sand 5,000-27 ft; second sand 5,065-87 ft.
Sinclair Prairie's No. 1 Jerome, SW cor. Sec. 15-20-2w.. Drlg. 5,253 ft.

OKLAHOMA COUNTY

Mid-Continental Oil Co.'s No. 1 Edwards, C SE SE Sec. 19-11-1 ..... Rig.

OKFUSKEE COUNTY

Natl. Investors' No. 1 Billy, SE NW NW Sec. 29-12-9.... Drlg. 3,300 ft.

PAYNE COUNTY

Kemp & Nunnelee's No. 1 Crane, SW SE SW Sec. 10-17-6 Drlg. 490 ft.
O. N. Maines et al's No. 1 Scheldberg, NW SW NW Sec. 27-22-6 ..... Drlg. 1,625 ft.

PITTSBURG COUNTY

Moffett & Hall's No. 1 Jones, C NE NW Sec. 14-3-14 .. Drlg. 1,475 ft.

PONTOTOC COUNTY

Edna Marie's No. 1 McWhorter, NE SE Sec. 11-2-6.... Drlg. 800 ft.
Brydia et al's No. 1 Thomas, SW NE Sec. 20-3-7..... Rig.
Gilbert's No. 1 Starritt, NW SE Sec. 28-4-6..... Drlg. 790 ft.
Choctaw O. & G. Co.'s No. 1 Thompson, SW NE SW Sec. 1-1-7 ..... Drlg. 750 ft.
W. E. McGraw's No. 1 Mayhue, NE Sec. 19-3-6..... U.R. 465 ft.
Williams' No. 1 Kroth, NE SE Sec. 33-3-4..... Drlg. 1,717 ft.
Wirrick's No. 1 Lee, SE SW Sec. 29-2-7 ..... Drlg. 985 ft.

POTTAWATOMIE COUNTY

Payne Drlg. Co.'s No. 1 Lovelace, NW SW NW Sec. 27-6-4 Drlg. 3,623 ft.

SEMINOLE COUNTY

Filmlee's No. 1 Bowlegs, SE NE SW Sec. 1-7-7 ..... Drlg. 440 ft.
Armstrong et al's No. 1 Diamond, NE SE SW Sec. 8-6-7.. Spudding.
Donnelly et al's No. 1 Shepard, SE NE Sec. 4-8-5 ..... Sand 1,395-1,405 ft; wtr.; fishing 1,640 ft.

Southern Oklahoma

ATOKA COUNTY

L. E. Stewart et al's No. 1 Stewart, SE SE Sec. 2-4s-10.. Drlg. 1,607 ft.

CARTER COUNTY

P. Turner's No. 1 Dove, NE NW SE Sec. 2-5-1..... Rig.
E. M. Boring's No. 1 Morgan, C NE NW SW Sec. 4-1s-3w. Showing 12,000,000 ft. gas 2,938 ft; C.O.; set 8-in. 1,798 ft; showing 10 bbls. per hr.; 8,000,000 ft. of gas.

JEFFERSON COUNTY

Abbott et al's No. 1 Simmons, NW cor. Sec. 14-4s-6..... Drlg. 810 ft.
Hobbs' No. 1 Barnett, NE SE SW Sec. 32-5-5w..... Drlg. 2,050 ft.
Wakefield's No. 1 Kelly, NW SE Sec. 1-5-8w..... Drlg. 550 ft.

MARSHALL COUNTY

Thomas' No. 1 Setliff, SW SE SE SW Sec. 26-5-6..... Drlg. 1,110 ft.

STEPHENS COUNTY

Doyle Oil Co.'s No. 1 Cunningham, SE NE NW Sec. 4-1-6w ..... Drlg. 2,300 ft.
Navajo O. & G. Co.'s No. 1 Martin, SE SW NW Sec. 18-1-5w ..... Drlg. 2,390 ft.

TILLMAN COUNTY

Emenheser et al's No. 1 Pace, C SW Sec. 3-4s-17w..... Drlg. 2,960 ft.
Gypsy Oil Co.'s No. 1 Pitcher, NW Sec. 36-4s-15w..... Fishing 2,760 ft.

Southern Oklahoma Wildcats

In southern Oklahoma wildcat tests are nearing interesting depth in Stephens and Jefferson Counties.

The Navajo Oil & Gas Co.'s No. 1 Payne, SE cor. SW NW Section 18-1n-5w, Stephens County, 13 miles northwest of Duncan, was drilling at 2,500 feet in shale. This test is seeking the Wilcox sand, which is believed to be around 6,500 feet.

F. H. McHenry and others' No. 1 Williams, NW cor. SE Section 19-2n-8w, Stephens County, was drilling at 2,650 feet.

J. D. Wooley and others' No. 1 Shaw, SE cor. NW Section 20-2n-8w, a wildcat, was rigging up.

Doyle Oil & Gas Co.'s No. 1 Cunningham, SE cor. NE NW Section 4-1n-6w, a wildcat, was drilling at 2,350 feet.

M. X. Hobbs and others' No. 1 Burnett, SE cor. SW NE Section 32-5s-5w, a wildcat in Jefferson County, was drilling at 2,050 feet.

Bridwell Oil Co.'s No. 1 Seay, SE cor. NE SE Section 5-7s-5w, Jefferson County, was shut down at 1,950 feet.

In the Tatums Field in Carter County, Wirt Franklin Petroleum Corp.'s No. 1 Burton, NE cor. SW SE Section 31-1s-2w, on the edge of the south extension area of the field, will probably be abandoned at 2,670 feet as a dry hole.

Lloyd Oil Co.'s No. 1 Majors, SE cor. NW SE Section 25-1s-3w, was rigging up rotary tools.

Davis Oil Co.'s No. 1 Brady, SW cor. NW Section 10-2s-11w, Cotton County, was rigging up rotary tools.

To Test Waukomis Structure

An interesting wildcat test was announced during the week on the Wau-

komis structure south of Enid in Garfield County. The location has been staked and the slush pit was being dug for J. H. Lewis and others' No. 1 in the C NW NW Section 34-21-6w. Drilling is expected to start not later than July 1. The location for this wildcat has been discussed for some time, but it was not announced until after three seismograph crews had surveyed and checked the territory under lease. Another seismograph crew is at work in the township at this time.

One of the previous seismograph surveys extended westward from the Garber-Covington area and terminated on the west side of Township 21-6w, covering an area of about 20 miles. It is believed that this survey showed a syncline dipping to the west and that a structure was found rising to a perfect dome in Township 21-6w, and 20-6w.

The Indian Territory Illuminating Oil Co. owns approximately 20,000 acres of leases in the vicinity and also considerable royalty around this location in Township 21-6w, and 20-6w. Other companies with acreage in the vicinity include the Gypsy Oil Co., Pure Oil Co., Empire Oil and Refining Co., Stanolind Oil and Gas Co., Amerada Petroleum Corp., Wilcox Oil and Gas Co., and Mid-Continent Petroleum Corp.

A large part of northwestern Oklahoma has been covered by geological and seismograph surveys during the last few years. It is rumored that a number of blocks in Garfield, Woods, Woodward, Major and Kingfisher Counties are ready for drilling within a year, if deals can be made to finance the tests.

Seminole Potential Test

The Corporation Commission's hearings on the taking of new potentials in the Greater Seminole area of Oklahoma was held on May 17, with witnesses agreeing that oil well potentials should be taken by leases and not by individual wells. No order has been issued, pending an executive conference of the Commissioners later.

A number of witnesses testified that to take potentials by individual wells would require costly equipment and that to take potentials on a lease basis would not result in discrimination.

When the Greater Seminole area was producing at its peak in 1927 it made around 531,000 bbls. in one day and many predicted that the field would be ruined within a year, by reason of numerous extensions, but the field is still one of the most important producing areas in the Mid-Continent and it is believed by many that it can be depended upon to produce considerable oil for years to come.

The method suggested by witnesses for the taking of new potentials in the Greater Seminole area, were on a 48-hour and on a lease basis. There were no objections and the Commission took the matter under advisement with indications that an order may be issued for potentials tests to start in June.

"Shooting" Old Field

In the older areas of Oklahoma seismograph surveys are being made which are to lead to additional deeper drilling. This is especially true in Okmulgee County and surrounding counties. This work is expected to result in new drilling operations within a radius of 20 miles of the city of Okmulgee. Eight or ten areas in the county were selected for a seismograph survey. The work was carried on south, southwest and northwest of the city. The principal object of the test was to map the Viola lime which is found from 2,700 to 3,200 feet in that region.

Sinclair Prairie Oil Co.'s No. 1 Jerome, SW cor., Section 15-20-2w, a wildcat east of production in the Wents Pool area in Noble County found the Wilcox sand at 5,253 feet and after drilling to 5,255 feet it was shut down to land casing at 5,251 feet. It is believed that this test is running some lower on structure compared to the other producing wells in that field and its outcome is being watched with interest.

Champlin Refining Co.'s No. 1 Graves, SW cor. NW NW, Section 21-20-2w, reached a total depth of 1,645 feet and was found to be 30 per cent off vertical. The present hole will be plugged and the rig skidded and a new hole started.

Continental Oil Co.'s No. 1 Thompson, NW cor. SW SW, Section 7-24-4w, was drilling in the Mississippi lime at 5,920 feet. It is a wildcat test in Garfield County, near Hunter. The well has been drilling in lime for approximately the last 400 feet.

New Law Constitutional

The first test of the new proration law in Oklahoma was decided before three Federal judges who declared it was constitutional and dismissed the injunction suit filed by the Sterling Refining Co. of Oklahoma City.

The attorneys for the Sterling Refining Co. served notice of appeal in open court after the court had sustained the petition of the state's attorney to dismiss the case.

The Sterling Refining Co. claimed it had a right to produce its two wells in the Oklahoma City Field to a maximum of 5,000 bbls. daily in order to supply its refinery. A temporary restraining order preventing the Oklahoma Corporation Commission, the proration attorney, or any of their employes from interfering with the production from the wells was asked.

The case was heard before Judges George T. McDermott, of the Circuit Court of Appeals; F. E. Kennamer and Edgar S. Vaught, of the Federal District Courts.

Creek County

J. B. Steiner's No. 1 Simms, NE cor. NW SE Section 1-15-10, is a location.

Riverland Oil Co.'s No. 1 Smith, NW cor. SE NE Section 29-15-9, is a rig. Leatherock and Bankston's No. 1 Coonrod, SE NE SE Section 3-19-9, made 25 bbls. from 1,979-2,005 feet. A. W. Swift's No. 1 Bruner, CEL SW SW Section 3-19-9, made 500,000 feet of gas from 1,250-62 feet. Pepis and others' No. 1 Cheatham, NE cor. SE SW Section 32-19-9, made 35 bbls. from 2,110-46 feet. Fortner and others' No. 1 Sharp, SE cor. SW Section 32-19-9, made 3,000,000 feet of gas from 1,587-94 feet. Robinson and others' No. 2 Prince, SW cor. NE Section 3-18-8, made 35 bbls. from 2,512-37 feet. Dixie Oil Co.'s No. 4 Walker, C NW SW SW Section 21-18-9, an old well drilling deeper, total depth 2,615 feet.

Carter County

Wirt Franklin Petroleum Corp.'s No. 1 Burton, NE cor. SW SE Section 31-1-2w, was abandoned at 2,760 feet.

Hughes County

Mid-Continent Petroleum Corp.'s No. 2 Bruner, SE cor. NW SE Section 9-7-8, made 490 bbls. from 2-887-2,941 feet. Murrah and Bohannan's No. 2 Jacobs, NE cor. SE NE Section 16-7-8, made 100 bbls. from 2,905-30 feet.

Lincoln County

Magnolia Petroleum Co.'s No. 1 Wagoner, SW cor. SE Section 2-14-3, is a location. Deep Rock Oil Co.'s No. 1 Harris, SE cor. NW Section 9-15-5, is a rig; an old well drilling deeper.

Marshall County

Russell-Whan Development Co.'s No. 1 Durean, NE cor. Section 2-8s-5, was drilling at 591 feet. Kingston Oil & Gas Co.'s No. 1 Adams, SE cor. SW Section 31-7s-6, made 15 bbls. from 539-43 feet. Thompson and others' No. 1 Null, NE cor. SW NW Section 24-5-5, was abandoned at 703 feet.

Oklahoma County

Phillips Petroleum Co.'s No. 2 Beaucamp, NW cor. SW SE Section 22-11-3w, is a location.

Okmulgee County

W. B. Pine's No. 1 Chamberlain, NW cor. NE Section 3-14-12, is a location.

Osage County

Sinclair Prairie Oil Co.'s No. 1, SW cor. NW SW Section 22-25-6, made 25 bbls. from 2,740-74 feet. Lewis Production Co.'s No. 1, SW cor. NW Section 27-24-7, made 55 bbls. from 2,518-86 feet. Siluran & Moore's No. 36, SW cor. NE NE, made 1,000,000 feet of gas from 1,733-34 feet.

Pottawatomie County

Mid-Continent Petroleum Corp.'s No. 1 Brandenberg, SW cor. NE Section 33-7-4, is a rig. Gypsy Oil Co.'s No. 2 Gray, NW cor. SW Section 25-6-4, is a rig. Amerada Petroleum Corp.'s No. 1 Shirley, NE cor. SE Section 26-6-4, made 1,972 bbls. from 3,385-3,403 feet.

Pontotoc County

Boetcher Oil & Gas Co.'s No. 1 Huber, NE cor. SW NW Section 7-3-7, was abandoned at 1,084 feet.

Tulsa County

Bryan Petroleum Co.'s No. 1 Clinton, NE cor. SW SW NW Section 26-17-14, was spudding. A. B. Ice's No. 1 Willis, CWL SW SE Section 15-16-12, was abandoned at 2,485 feet.

IMPORTANT BOOKS
for the Oil Man's Library

"PETROLEUM FACTS AND FIGURES"

In 1928 the American Petroleum Institute authorized the publication of a handbook on the petroleum industry that is known as "Petroleum Facts and Figures," and editions were also published in 1929, 1930 and 1931. These four volumes are independent of each other but all contain the same general type of information with additions from year to year to bring the data up to date.

The books cover many phases of each branch of the industry and also contain much data on allied industries which are closely associated with oil. The distribution and use of petroleum products has become so universal in its scope that the users are inclined to accept it as a commonplace commodity and give little thought to its source, production, transportation, refining and marketing.

If the public realized the important part the oil industry is playing in every industry today there would be a better understanding of the petroleum industry's many problems. Also the users would be led to more conservative use of the products of this very valuable fluid and would come to realize that it plays an irreplaceable part in the nation's future.

"Petroleum Facts and Figures" are divided roughly into statistics and information on world production and consumption; the petroleum industry in the United States; gasoline; gasoline taxes; utilization of gasoline; utilization of fuel oil and gas oil and an appendix containing many facts about research, conservation and other details of general interest.

In the 1931 edition of "Petroleum Facts and Figures" in addition to the above general subdivisions there are included chapters on state taxation of gasoline, production of oil in the United States, with added chapters on transportation and refining, utilization of oil for heat, lubricating oils, asphalts and asphaltic products.

For anyone interested in any phase of the petroleum industry this series of books will prove of inestimable value because they have consolidated into relatively small space a world of facts that would take much time and research to procure from their original sources. Every little while some question about oil is being asked in every oil company's office and the discussion which follows might be quickly and satisfactorily settled by reference to "Petroleum Facts and Figures." In this way the book would serve a double purpose, an increase in knowledge for the readers and a reduction in time spent in checking up on debated problems or securing needed information for any purpose.

"Petroleum Facts and Figures" for 1931 may be purchased through the Book Department of The Oil and Gas Journal at the regular postpaid price of $2, payable by check or money order when book is ordered.

CORRECTION

In the review of "Natural Gas Handbook," which appeared in this department in last week's issue, the price of this book was incorrectly stated as $7.50. The correct price is $5 postpaid.

Industry Should Quickly Improve Says W. C. Teagle

In the annual report of the Standard Oil Company (New Jersey) President W. C. Teagle says:

"The serious consequences to the nation of the present deplorable situation support a belief that constructive conservation will be compelled, and that production will be brought under control despite a small minority group of operators which has upset previous attempts at regulation. In such an event, the industry should quickly experience improvement. A recovery in prices of crude and products is necessary to place this important basic industry in a position to contribute its share to the business revival now evident in some lines."

Report of Standard Oil Co. (New Jersey) and affiliated companies for year ended December 31, 1932, shows net profit of $282,865 after taxes, depreciation, depletion, amortization, interest, inventory loss on crude and refined products and minority interests. This is equivalent to one cent a share (par $25) on 25,740,965 shares of capital stock outstanding at end of year, and compares with net profit of $8,707,758 or 34 cents a share on 25,735,468 shares in 1931.

After payment of $50,628,442 in dividends, there was a deficit of $50,345,577 in 1932, comparing with deficit of $42,500,678, after distribution of $51,205,436 in dividends, in 1931.

Current assets as of December 31, 1932, including $116,857,704 cash and $61,772,692 marketable securities, at cost, amounted to $574,782,127 and current liabilities, including $26,377,907 obligations due in 1933 in connection with the Pan American Foreign Corp. purchase, were $127,630,880. On December 31, 1931, cash was $73,196,486, marketable securities, at cost, were $206,604,534, current assets amounted to $671,154,621 and current liabilities $85,916,258.

The decline in the amount of marketable securities at close of 1932 was due largely to a reclassification of certain securities which were formerly carried in the current account and are now classified as permanent investments,

New Producing Horizon in Hollow Pool, Kansas; Some Kansans Won't Sell Oil at 25 Cents

By W. A. SPINNEY
Staff Correspondent Kansas Fields

As the result of low crude oil prices the daily average production of the Kansas oil fields shows a decline of more than 5,000 bbls. daily. The daily average for the week ending May 20, was 110,500 bbls. It is believed that about 15 per cent of the operators in the Ritz-Canton Pool, in McPherson County, have shut in their production as the result of low crude oil prices and a further decline in production is predicted if the crude oil price remains at 25 cents a barrel.

A new producing horizon was discovered in the Hollow Pool, in Harvey County, with the finding of oil in the Kansas City lime or Lansing formation. The Magnolia Petroleum Co.'s No. 1 Schmidt, NE cor. NW NE Section 30-22-3w, in the south end of the producing area of the pool, was estimated at 100 bbls. a day from the Lansing lime at 2,499-2,520 feet. It was treated with acid and it increased its production to an estimated 20 bbls. an hour, on the swab. If the production holds, additional wells are expected to be started in the south end of the field.

Production By Pools

The average daily production of the principal pools in the state for the week ending May 20, was as follows:

Pool—	Bbls.
Hollow Pool	6,850
Ritz-Canton	18,700
Voshell Pool	6,150
Sedgwick County	10,500
Mabee (Nikkel)	7,435
Ellsworth County	2,050
Barton County	685
Rice County	2,440
Reno County	1,740
Stafford County	275
Total	56,975
Others	53,525
	110,500

The Central Commercial Oil Co.'s No. 2 King, SE cor. SW NE Section 20-13-21w, Trego County, was drilling at 3,067 feet on the last report. It is the only well drilling in Trego County at the present time.

Gypsy Oil Co.'s No. 3 Endured, NE cor. SE Section 17-35-3w, in the State Line Pool, Sumner County, was rigging up standard tools at 4,532 feet.

Dry Hole on Chase Townsite

The first dry hole to be found on the Chase Townsite in Rice County was completed during the week about a quarter of a mile to the northwest of the other production. The test was Douglass and others' No. 1 in approximately the NW cor. NE SE NE, Section 31-19-9w, on Block 50, of the Chase townsite. Siliceous lime was found from 3,286-3,337 feet and the showing of oil was found at 3,310 feet. The water was found at 3,330 feet. It will probably be abandoned.

There are two producing wells in the townsite that had an initial production around 350 bbls. a day, one test drilling and two other rigs up. Ramsey and others' No. 1 Ira, SW cor. NW NW, Section 32-19-9w, was drilling at 1,000 feet. Same operators' No. 1 Robinson, SW cor. NW, Section 32-19-9w, is a rig. E. F. James and others' No. 1, NE cor. SE SE, Section 31-19-9w, is a location.

Atlantic Oil Producing Co.'s No. 1 Gates, NW cor. SE, Section 27-21-13w, a wildcat well in Stafford County, was given a 24-hour test for potential and made 267 bbls. of oil from Siliceous lime at 3,679-3,704 feet. The company has erected 3,000 bbls. of storage on the location and will treat the well with acid. The oil tests 39 gravity A.P.I. It is 11 miles from a pipe line.

Activity is expected to increase in the southern part of Barton County and the northern part of Stafford County. The new well of the Atlantic Oil Producing Co. in Section 27-21-13w, opens considerable new territory for exploration. It is 9 miles from the nearest production and is in an area that has not been explored.

Other wildcat tests in Barton County include the Noble Drilling Co.'s No. 1 Grant, SW cor., Section 4-20-11w, which has been on the pump for about a week. It has been making around 3 bbls. of oil an hour from the pay at 3,325-35 feet, total depth 3,362 feet.

Rankin and others' No. 1 Sooey, C SW NE, Section 34-18-12w, Barton County, found the Oswald lime at 3,038 feet. The crew is landing casing at 3,040 feet and it started caving. It is believed the Oswald lime was showing oil.

Chat Gassers Drilled Deeper

In the northwest part of the Ritz-Canton Field in McPherson County, there were 20 chat gas wells. These wells had a potential production of around 400,000,000 feet of gas a day. The deeper drilling of some of these chat wells to the Viola lime greatly reduced the number of gas producers, until there are now only 11 chat gas wells.

W. D. Dunn and others' No. 1 Severton, SE cor. NE SE Section 9-19-2w, in the northwestern part of the Ritz-Canton Field, was underreaming 8-inch casing to shut off water, before drilling into the Kansas City lime. The total depth is 2,317 feet.

Another chat gas well was being added to the east side of the Ritz-Canton Pool, the Shawver Oil Co. and others' No. 1 Klassen, SW cor. NE NW Section 21-19-1w, found a showing of gas at 2,916 feet. The crew was preparing to land and cement casing at that depth before drilling into the chat. The test is an offset to a 59,000,000-foot gas well.

Lario Oil and Gas Co. and others' No. 4 Gratton, Section 24-19-2w, is landing 6-inch casing at 3,382 feet in the Viola lime. Same company's No. 4 Miller, in Section 24-19-2w, swabbed 11 bbls. an hour from the Viola lime at 3,379-94 feet. It was then shot with 15 quarts and made 20 bbls. an hour.

In the Hollow Pool

In the Hollow Pool, in Harvey County, Detrick and others' No. 1 Thiessen, in Section 29-22-3w, has been drilled to a total depth of 3,524 feet in Hunton lime and will be treated with acid from 3,419 to 3,422 feet.

W. C. McBride Inc.'s No. 2 Schmidt, in Section 30-22-3w, made 165 bbls. of oil in 24 hours from the Hunton lime at 3,400-18 feet.

In the Voshell Pool, in McPherson County, Inman and others' No. 2 Neufeldt, in Section 16-21-3w, will test a showing of oil in Viola lime at 3,452-86 feet.

Mylius and others' No. 2 Regier, in Section 16-21-3w, pumped 660 bbls. in 24 hours from the Viola lime at 3,435 feet.

A new location was announced in the north Hollow Pool, in Harvey County, by Sinclair Prairie Oil Co.'s No. 2 Neufeldt, SE cor. NE Section 18-22-3w. This location is a direct offset to the Skelly Oil Co.'s No. 1 Schmidt, which has a potential of 2,000 bbls. a day.

In the Mabee Pool, in McPherson County, Mid-Kansas Oil & Gas Co.'s No. 3 Schmidt, Section 33-21-3w, found water at 3,591-3,605 feet and is being plugged back to 3,566 feet. It had Hunton lime from 3,437-41 feet, where it made 70 bbls. in six hours.

A semiwildcat test will be drilled a half mile west of the Harvey County line in Reno County. Miller and Engler's No. 1 Balzer, SE cor. NW Section 36-22-4w, is expected to start at once. The test is about three-quarters of a mile north of production in the Haury Pool. The test is located on a 20-acre lease.

McPherson Field Largest Producer

McPherson County still leads the State in crude oil production. It has been producing an average of 34,800 bbls. per day this year and continues to lead all other pools in the State. In the four months ending May 1, 1933, the county produced 4,137,000 bbls. of oil. The Canton-Decker Field leads the county in the amount of oil produced, yielding 1,789,500 bbls. in the last four months.

The Ritz Pool district has produced 522,942 bbls. of oil to bring the total of the East McPherson district to 2,402,488 bbls. The Voshell Pool, in East McPherson County, is second in production with a total of 945,316 bbls. during the first four months of the year.

The Mabee Pool, which is directly south of the Voshell Pool, is a new area and has been showing a steady increase in its monthly production since it was opened last November. The total produced this year from the Mabee Pool is 572,865 bbls. up to May 1. In January the pipe line shipments totaled 76,198 bbls. and in April they totaled 229,289 bbls.

The Johnson Pool, immediately southwest of the townsite of McPherson, has yielded the least amount of oil in the area. This is a chat producing field with 17 wells. The first four months of the year the pool produced 217,199 bbls. of oil.

Greenwood County

Molter & Henderson's No. 4 Lewis, C SW Section 25-27-8, was drilling at 475 feet.

Harvey County

Sinclair Prairie Oil Co.'s No. 2 Neufeldt, SE cor. NE Section 18-22-3w, is a rig. Shell Petroleum Corp.'s No. 1 Schmidt, SE cor. NE Section 5-22-3w, made 576 bbls. from 3,501-30 feet. Same company's No. 1 Schmidt, NE cor. NW SW Section 17-22-3w, made 1,006 bbls. from 3,452-74 feet. Same company's No. 2 Schmidt, NW cor. SW Section 17-22-3w, made 1,902 bbls. from 3,438-50 feet. Skelly Oil Co.'s No. 1 Schmidt, SW cor. NW Section 17-22-3w, made 1,740 bbls. from 3,421-55 feet. Sinclair Prairie Oil Co.'s No. 1 Ediger, NE cor. SW Section 19-22-3w, made 720 bbls. from 3,416-24 feet. Skelly Oil Co.'s No. 2 Martens, NE cor. SE SE SE Section 19-22-3w (twin), made 1,219 bbls. from 3,452-84 feet.

Rice County

Douglass and others' No. 1 McFadden, NW cor. NE SE NE Section 31-19-9w, was abandoned at 3,337 feet.

Woodson County

Sheedy and others' No. 1 Eades, NE cor. SE Section 24-25-13, made 5 bbls. from 1,490-92 feet.

Wildcat Operations in Kansas

(Descriptions are East unless marked otherwise)

BARTON COUNTY

Company, farm and location— Remarks:

Noble Drlg. Co.'s No. 1 Grant, SW SW Sec. 4-20-11w.... T.D. 3,362 ft; P.B. to 3,325-35 ft. pumped 12 bbls. daily.

Rankin et al's No. 1 Sooey, C SW NE Sec. 34-18-12w... Drlg. 3,150 ft.

COWLEY COUNTY

E. Yarnell's No. 1 Speer, SE NE NE Sec. 31-33-6 ..... Rig.

ELK COUNTY

Austin et al's No. 1 Wade, C NE NE Sec. 9-29-12 ..... Drlg. 1,680 ft.

ELLSWORTH COUNTY

Rex Etnyre's No. 1 Arasman, C SW SW Sec. 10-15-7w.. Rig.

GRAHAM COUNTY

Schleimeyer et al's No. 1 Smith, SE Sec. 24-8-25w..... Fishing 4,180 ft.

GREENWOOD COUNTY

Chas. Reser et al's No. 1 Hull, NW SE Sec. 8-26-9 ..... Drlg. 1,650 ft.

Reeser & Chriswell's No. 1 Wright, C SW SW Sec. 28-25-10 ..... Spudding.

Wright's No. 1 Madren, SW SE SW Sec. 29-22-13..... Machine.

Knight et al's No. 1 Moser, NE SW SW Sec. 31-22-13.. Drlg. 1,700 ft.

McPHERSON COUNTY

Sever and Hessman's No. 1 Scrag, 8¼ SE Sec. 22-19-4w.. Rig on ground.

Darby Pet. Co.'s No. 1 Bruckey, NE NW NE Sec. 24-19-1w ..... Drlg. 3,325 ft.

Gaume & Maxwell's No. 1 Goering, NE SE SW Sec. 24-23-3w ..... Rig.

Investors Mineral Dev. Co.'s No. 1 Kaufman, SE Sec. 35-21-3w ..... Rig.

Roth & Farout's No. 1 Swanson, NE SW NE Sec. 13-19-3w ..... Rig.

PRATT COUNTY

Ninnescah O. & G. Co.'s No. 1 Hardesty, SW SE SE Sec. 28-27-11w ..... Drlg. 4,036 ft.

RENO COUNTY

Roth & Farout's No. 1 Yoder, C NW NW Sec. 15-24-5w.. C.O. 325 ft.

RICE COUNTY

Langston et al's No. 1 Wells, NE SE Sec. 4-20-9w..... Drlg. 1,750 ft.

ROOKS COUNTY

Kruger's No. 1 Rathburn, SE NW SW Sec. 14-9-16w..... Rig.

SALINE COUNTY

Dieter, Warren and Lario O. & G. Co.'s No. 1 Fulton, SW NW Sec. 14-16-2w ..... Drlg. 2,900 ft.

SEDGWICK COUNTY

Carter Oil Co.'s No. 1 Rowley, C E½ NE NE Sec. 30-25-2. Drlg. 3,267 ft.

STAFFORD COUNTY

Atlantic Oil Prod. Co.'s No. 1 Gates, NW SE Sec. 27-21-13w ..... Drlg. Sil. 3,679-3,704 ft; 10 bbls. brly.; swab 267 bbls. in 24 hrs.

SUMNER COUNTY

Deal O. & G. Co.'s No. 1 Tompkins, SW cor. Sec. 26-33-1. Fishing 3,690 ft.

SAN ANGELO TO CELEBRATE

SAN ANGELO, Tex., May 22.—Oil men who have taken part in the petroleum development of West Texas, and their families will be guests of San Angelo May 27 and 28 at a party celebrating the drilling in of the discovery Santa Rita well on University of Texas land in Reagan County. W. D. Holcombe, known as the "oil mayor" of San Angelo, will direct the fete, featuring a golf tournament, a barbecue, dance, aquatic sports and a boxing match.

Show of Oil and Gas in Sabine Parish Wildcat; Two Other Tests Turn Out Disappointments

By D. H. BANCROFT
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., May 22.—Two wildcats that were the source of quite a flurry last week on account of showings encountered turned out disappointments when it came to testing, one on account of salt water and the other due to "dust" and probably a junked hole. The first, W. O. Blackman, trustee's No. 1 Pardee Land Co., Section 36-22-10, Webster Parish, 6 miles northeast of Cotton Valley, tested salt water with a show of oil and gas at 2,565 feet, and was coring at 2,580 feet. The original show was such as to lead the operators to build storage on the location to handle the anticipated oil and was the cause of more or less of a scramble for what acreage, royalty and mineral rights there was available around the well and block. The other well, Lambert and others' No. 1 Edwards, in the NE cor. of Section 29-9-13, a mile and a quarter south of the Converse, Sabine Parish, discovery well, bailed dry on a show of oil at 2,070 feet that looked as if it might make a 50-bbl. well. Drilled to 2,965 feet during the week following the test, the crew was going in with core barrel when the line broke and the whole string of pipe fell a couple of hundred feet or more, bounced, wrecked the rotary and now the hole is full of junk.

To make things look a little better, R. L. Gay's No. 3 Long-Bell Lumber Co., NE NE Section 5-18-13, Sabine Parish, a rank wildcat half way between Zwolle and Converse, developed quite a show of oil and gas with a little mud on drill stem test Saturday at 2,049 feet and will set 6-inch for a test. Top of the marl was at 1,682 feet, top of the chalk at 1,708 feet and a drill stem test from 1,682 to 1,731 feet was dry.

NORTH LOUISIANA

All six of the new locations staked during the week were in Louisiana, as were the three completions, two of which were failures, and one an abandoned derrick, Gibson Oil Co.'s No. 1 Lyon, SE NW Section 34-20-14, Bossier Parish. The other two were in the Zwolle district of Sabine Parish, Doyle and others' No. 1 M. D. Russell, NE SE Section 23-8-12, salt water at 2,613 feet, and Robertson Drilling Co.'s No. 1 J. W. Hughes, Section 36-8-12, dry at 2,594 feet. Immediately on completion of this well, however, the company made location for No. 2 Hughes, SW NW Section 36-8-12, and is rigging up. T. E. Kelly has derrick pattern on location for No. 1 McClanahan, SW NW Section 36-8-11. Gibson & Johnson made location for their third well in Converse, No. 1 H. A. Pugh, SE SE Section 189-13, three-quarters of a mile north of their discovery well. Other new jobs begun during the week were: Louana Oil & Gas Co.'s No. 1 Winters, SE NE Section 4-18-16, Blanchard gas district of Caddo Parish, rigging up; United Gas Public Service Co.'s No. 30 Crossett Lumber Co., SE NW Section 25-22-4e, Morehouse Parish, location, and United Gas Public Service Co.'s No. 2 U. S. Government, SW NW Section 1-19-3e, Ouachita Parish, location.

Two wells on the north fringe of the Conroe-Jackson trend belt across central Louisiana that will be watched with interest are shut down: Terrel and Price's No. 1 Louisiana Central Lumber Co., NW NE Section 18-11-3e, Caldwell Parish, at 1,314 feet, and George Greer and others' No. 1 Louisiana Central Lumber Co., Section 2-9-6, Catahoula Parish, at 880 feet. United Gas Public Service Co.'s Lisbon wildcat in Claiborne Parish, No. 1 Meadows, Section 13-21-5, has drill stem stuck at 5,390 feet, total depth 5,561 feet. The original contract on this well was for 5,000 feet, but on reaching that depth it was decided to go to 5,500 feet and now there is some talk that it may be taken on down to 7,000 feet. In that case it will be the first of a number of such tests to be drilled in North Louisiana and Arkansas during the year, or whenever conditions in the industry in general have improved sufficiently to warrant such exploration in this territory. The same company's No. 1 Temple, Section 21-23-7, Claiborne Parish 3 miles east of Haynesville production, ran drill stem test at 4,435 feet, got 51 joints of salt water in 15 minutes and was coring at 4,469 feet.

E. R. Appleby's No. 1 Scales, SE SE Section 35-13-12, De Soto Parish, 6 miles south of Mansfield, topped the Nacatoch at 744 feet, chalk at 910 feet, and was drilling at 985 feet. Bailey Gantz' No. 1 Jenkins, SE SW, same section, is waiting for a string of casing to set, total depth 2,870 feet, in chalk.

Evers and Collingsworth claimed 6 feet of sand showing oil at 1,456-62 feet in No. 1 Hickman-Simmons, NW NW Section 40-4-1e, Rapides Parish, but were through it before returns got to the surface and did not test and are drilling at 1,480 feet.

Rolland Oil Co. (Frank Foster) is rigging up to drill No. 1 Stevens in the SE NW Section 17-9-11, Sabine Parish, half a mile northwest of Langbridge Oil Co.'s No. 1 Stevens, completed 18 months ago as a 20-bbl. flowing well and still making 15 bbls. Location is on a 2,000-acre block in wildcat territory south of Pleasant Hill townsite. Byers and others' No. 1 Ervin and Bishop, SW NE Section 16-7-11, Zwolle district of Sabine Parish, is making considerable showing of gas from 2,460-80 feet. In Converse territory, Mamie S. Hammonds' No. 1 Patrick, SW SE Section 1-9-13, 2½ miles northeast of Gibson & Johnson's second producer, in Section 15-9-13, topped chalk at 1,592 feet and was drilling at 2,074 feet. A. C. Scott's No. 1 Burkett, NW SW Section 10-9-13, three-quarters of a mile northeast of the same producer, was drilling plug at 1,802 feet, total depth 1,846 feet after a drill stem test last week developed 1 fourble of oil and 6 of mud. Llano Del Rio Co-operative Colony's No. 1 fee, SE NE Section 6-1n-9, Vernon Parish, claimed a gas show at 1,633-39 feet and was arranging for a drill stem test.

ARKANSAS

Things were even quieter in Arkansas than in Louisiana. There were no changes in the status of Miller County wells, all of which have been inactive for or three weeks or more, with the exception of Fitzwater and others' No. 1 Norsen, SE SW Section 20-15-27, several miles southwest of the center of development, which was drilling hard lime at 2,785 feet. T. J. O'Hara's No. 1 Martin, NW SE Section 3-8-1e, Desha County, is shut down at 140 feet on account of high water in northeast Arkansas and also waiting for surface testing. R. V. Harrell and others' No. 1 McGoughey, NW NW Section 22-7-10, Jefferson County, shut down at 512 feet for some time, has resumed activities and was coring at 2,370 feet. American Portland Cement Co.'s No. 1 fee, SW NE Section 21-12-32, Little River County, was still coring anhydrite at 2,360 feet, with the top around 2,250 feet.

Daily Average Runs

Daily average runs from the field continued the slump begun two or three weeks ago, most of which is attributable to Zwolle. Arkansas runs have remained fairly stationary. Runs from the two States this week totaled 56,110 bbls., a decline of 1,270 bbls. from last week's 57,380 bbls., which in turn was a decline of 1,135 bbls. Louisiana runs were 26,195 bbls., 1,240 bbls. under last week's, while Arkansas' 29,915 bbls. was only 30 bbls. less. Zwolle runs fell off 1,315 bbls., from 9,085 bbls. last week to 7,770 this week. Last week's runs in turn were 980 bbls. under the week before. Daily average runs from the several fields were:

NORTH LOUISIANA

	Bbls.
Caddo, light	5,055
Caddo, heavy	1,575
Cotton Valley	500
De Soto-Red River	1,665
Elm Grove	330
Haynesville	3,950
Holly	220
Homer	2,700
Pleasant Hill	250
Sarepta-Carterville	780
Urania	1,400
Zwolle	7,770
Total	26,195
Last week	27,435
Decrease	1,240

ARKANSAS

Champagnolle	1,335
El Dorado	2,610
Lisbon	405
Miller County	50
Nevada County	400
Smackover, light	2,575
Smackover, heavy	21,950
Stephens	150
Urbana	440
Total	29,915
Last week	29,945
Decrease	30
Both States	56,110
Last week	57,380
Decrease	1,270

Louisiana-Arkansas Proven Areas

North Louisiana

CADDO—BETHANY

Company, well, farm name, section and block—	Remarks:
Tom Collins Pet. Co.'s No. 1 Gill & Lipscomb, 663 ft. N, 1,566 ft. E, SW cor. Sec. 17-16-16	Derrick.

CADDO—BLANCHARD

Louana O. & G. Co.'s No. 1 Winters, 1,980 ft. N, 660 ft. W, SE cor. Sec. 4-18-16	Rigging up.

CLAIBORNE PARISH

Haynesville Partnership's No. 1 J. L. Garrett, 200 ft. S and E, NW cor. SW Sec. 25-23-8	Moving in rig.

DE SOTO PARISH

P. B. Dyer's No. 1 B. F. Jenkins, SE cor. NW SW Sec. 35-13-12	Derrick.

SABINE PARISH—ZWOLLE

Bryant & Lucas' No. 1 Andries, 360 ft. S, 350 ft. W, NE cor. NW SE Sec. 15-7-11	Began May 7; 10-in. 41 ft; S.D.
Byers et al's No. 1 Ervin & Bishop, 550 ft. E, 460 ft. N, SW cor. Sec. 16-7-11	Drlg. 2,430 ft.
Graham Prod. Co.'s No. 1 Liles, 330 ft. S and E, NW cor. SE SW Sec. 23-8-11	T.A. 2,700 ft.
T. E. Kelly's No. 1 McClanahan, 1,000 ft. S, 330 ft. E, NW cor. SW NW Sec. 36-8-11	Derrick pattern.
Ben Merritt et al's No. 1 L. A. Cook, 330 ft. N, 333 ft. W, SE cor. Sec. 24-8-11	Began drlg. May 12; 10-in. 40 ft.; drlg. 150 ft.
E. F. Neely's No. 1 Garner, SE cor. SW NE Sec. 15-7-11	Began drlg. May 14; 10-in. 40 ft.; drlg. 550 ft.
Robertson Drlg. Co.'s No. 2 Hughes, 330 ft. S, 660 ft. W, NE cor. SW NW Sec. 36-8-12	Rigging up.
Service Drlg. & Royalties Co.'s No. 4 E. E. Smith, 330 ft. S and W, NE cor. SW SW Sec. 7-7-10	Rigging up.
Scully & Beach's No. 3 Lafitte, 1,030 ft. S, 134 ft. E, NW cor. Sec. 13-7-11	T.A. 2,636 ft.
C. H. Tuttle's No. 4 Byrd, 990 ft. S, 320 ft. E, NW cor. NW NW Sec. 7-7-10	Derrick.

Wildcat Operations in Louisiana-Arkansas

(Rotary operations unless otherwise designated)

North Louisiana

BOSSIER PARISH

Company, well, farm name, section and block—	Remarks:
Cryer Oil Co.'s No. 1 fee, 2,400 ft. N, 1,080 ft. E, SW cor. Sec. 25-19-13	Cmtd. 6-in. csg. 852 ft; drilled plug; W.O.
A. W. Phillips, tr.'s No. 1 Oden, 300 ft. W, 150 ft. N, SE cor. NW NW Sec. 4-18-13	Set 6-in. with packer 1,607 ft.; bailed dry 1,714 ft; W.O.
B. A. Sherrell, tr.'s No. 1 fee, NE NW NW Sec. 13-19-12	Derrick pattern.

CADDO PARISH

Nelson Oil Corp.'s No. 1 Taylor, 200 ft. N, 300 ft. E, SW cor. Sec. 13-18-14	Drlg. 1,974 ft.

CLAIBORNE PARISH

United Gas Public Service Co.'s No. 1 Meadows, approximately 100 ft. S, center E½ E½ Sec. 13-21-5	D.S. Stuck 5,390 ft; T.D. 5,561 ft.
United Gas Public Service Co.'s No. 1 Temple, 1,340 ft. W, 660 ft. N, SE cor. Sec. 21-23-7	Coring 4,469 ft.

DE SOTO PARISH

Bailey Gantz et al's No. 1 Jenkins, NW cor. SE SW Sec. 35-13-12	Waiting for csg.; T.D. 2,870 ft. in chalk.
Mrs. A. L. Ibach, tr.'s No. 1 Rambin, 250 ft. S and E, NW cor. NE NE Sec. 33-11-11	W.O. 3,537 ft.

(Continued on Page 77)

Start Interesting New Tests in Southwest Texas; Several Once Promising Wildcats Dropped

By B. D. STEVENSON
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., May 22.—With the exception of Crude Oil Royalty Co.'s No. 1 Allen, in the Sandia Field in northeastern Jim Wells County, which blew in at 2,648 feet and ran wild for a few hours from a new sand, Southwest Texas was almost free from any unusual happenings the past week. There were some abandonments of interesting wildcats that in times past have held attention and some interesting new tests have been started.

No. 1 Allen, in Jim Wells County, is about a mile southeast of the two gassers spraying oil brought in by J. E. Walsh two years ago at about 2,900 feet and now the property of Larco Gas & Petroleum Co. The sand that blew out in No. 1 Allen was found in the other wells, it is claimed, but never tested. Casing was being set late in the week in No. 1 Allen. The gas had an odor of oil which is the only foundation for hope it will make an oil well.

Among the abandonments of the week is that of John O'Neill's No. 1 Plummer in northwestern Bee County, and with its abandonment at 4,253 feet the only active wildcat in Bee County at this time is Grisham and others' No. 1 Rapp & Hatch which spudded in the past week and is just outside of the Tuleta Field. Humble's No. 1 Imogene Hall was abandoned the week before.

One new wildcat has been announced in DeWitt County, No. 1 Wade fee, but information on the exact location is deficient.

Duval and McMullen Wildcats

In Duval County an entirely new crop of wildcats has taken the place of those which a few weeks ago were the center of attention, and this also prevails up through McMullen County where there was hot play along the Government Wells trend. Shasta Oil Co. abandoned its No. 3 Peters at 3,252 feet. It is a little south of No. 1 and No. 2 Peters, each of which came in gas and raised the hope of a new oil pool. Production was in the Government Wells sand and at about the same depth. Additional tests, however, have failed to find oil and for a time the spot is eliminated as a prospect for a new oil pool.

The same thing is true of the situation 7 miles east of the North Government Wells Pool where Smith & Hunter brought in their No. 1 Pena a gas well at 1,910 feet, presumably in the Cole sand. Their No. 1 Olivarez drilled a little to the southeast, following the usual idea as to geology, failed to get the same sand or any other sand that would produce and has been abandoned at 3,620 feet, eliminating another spot that for a time looked like a good prospect. No announcement has been made of any intentions to drill additional tests around either spot.

Northwest of the North Government Wells Pool where Stewart got a good gas well in the Cole sand in Survey No. 362 and later a dry hole in the Government Wells sand to the northeast of it, he has moved west about a quarter of a mile from the gasser and has spudded in No. 3.

South of this, Whisenant & Trenchard are down 1,600 feet or more in their test in Survey No. 76, and still farther south of them and west of the Shasta Pool, Mortimer has spudded in his No. 1 Peal. These three tests are playing a territory west of, and parallel to that of the Government Wells district.

Northeast of the North Government Wells Pool, DeSoto Oil Co. is down below 1,500 feet in No. 1 Wood-Welder and it should pick up the Government Wells sand at around 2,400 feet, more or less, the same depth as in the Government Wells Pool. With the exception of the S.R.C. Oil Co. and Sinclair Prairie's No. 2 LaChusa about 20 miles farther northeast just spudded in, and Pope's No. 1 Miles in southwestern McMullen, there are no wildcats in southern McMullen. Pope got the Mirando sand but got it dry and is drilling deeper.

John J. O'Hern has spudded in and is down several hundred feet in his No. 1 Smith-Corkill in Survey 491 in Duval County about 6 miles southeast of the Sarnosa Field and a little southwest of where Plymouth Oil Co. recently drilled a couple of tests on the Hoffman ranch. This is going to be one of the interesting wildcats of the county.

Shumway drilled two dry holes on the Shiner ranch in central McMullen County which though dry seemed to indicate a structure. He is moving in rig to drill another test on the same ranch about 2 miles north of the first two.

In southern Starr County there is some revival of interest in the B. & B. Oil Co. test southeast of the Rio Grande City Pool which has been standing below 4,000 feet with a good showing of gas. Casing, it is claimed, is now to be set and the test made in a few days.

Balcones Fault

Balcones fault saw the practical elimination the past week of Paton Brothers' test in Lee County at 6,009 feet and still in the Austin chalk. The contract called for the Edwards lime or 6,000 feet and with chalk at 6,009 feet it looks like a downthrow location. It is on the Tanglewood fault which has long been known to the industry and resulted in many prophecies of a big field. It is possible that additional tests will yet be drilled before the acreage is finally abandoned as condemned.

There is talk of some additional Edwards lime tests along the Balcones fault but at the present time the platter is swept nearly clean. Zavala Oil & Gas Co.'s No. 1 Gates in Zavala County at the far western end of the Balcones fault zone is still shut down but due to resume soon. O. N. Beer has spudded in an Edwards lime test in southern Bexar County that is said to have much to commend it but Guadalupe, Caldwell and Bastrop are quite free from Edwards lime tests that are actively drilling.

Serpentine Activity

In the Serpentine activity in Bastrop Humble's No. 2 Friske found Serpentine at 2,465 feet but at 2,600 feet and still in Serpentine had no oil.

Saxet Field had a disappointment in Sinclair Prairie's No. 1 Issencee which set casing to test sand at 4,899 feet but got salt water. Holliday's No. 2 Smith at 4,869 feet tested salt water after setting casing and is pulling tubing and, Houston Oil Co.'s No. 1 McGregor at 4,869 feet is waiting for casing after getting a good showing of oil and both are in the northern part of the field. One other test in this field is followed closely, Gulf Port's No. 3 Frank Bliss because it is down 5,616 feet and drilling, the deepest test in the field.

Wildcat Operations in Southwest Texas

Week Ending May 20

Company, farm and location—	Remarks:
ATASCOSA COUNTY	
A. Blume's No. 1 Shaw, 690 ft. from N line, 1,780 ft. from E line of 100-ac. tract in W. Farquhar Sur. No. 275	T.D. 1,603 ft; waiting on csg.
O. W. Killam's No. 1 Seitz, 1,700 ft. from NE line, 5,150 ft. from NW line of Cruz Landin Sur. No. 45	T.D. 3,350 ft.; drlg.
BASTROP COUNTY	
Champion's No. 1 Rivera, center W½ of 200-ac. tract in Osborne Sur.	T.D. 2,235 ft.; abnd.
J. E. Emanuel's No. 1 H. Klemm, 817 ft. from W line, 300 ft. from S line of tract in R. S. Teal Sur.	T.D. 263 ft.; fuel oil sent out.
Marts and Beavens' No. 1 Reyes, 750 ft. from W line, 150 ft. from S line of 68-ac. tract in Addison Lytton League	T.D. 2,000 ft.; drlg. hard Serp.
BEE COUNTY	
John O'Neil's No. 1 Plummer, in NW part of county, 150 ft. from N and E lines of 660ac. tract in Sec. 34, Chessman Sur.	T.D. 4,253 ft.; abnd.
BEXAR COUNTY	
C. I. Albertson's No. 1 Vogt, 2,100 ft. from N line, 240 ft. from E line of 237-ac. tract in Sec. 2 of S. McCollough Sur. No. 53	T.D. 906 ft.; set csg.
Wm. V. Ballard's No. 1-A San Antonio Land & Dev. Co., 1,000 ft. from N line, 450 ft. from W line of tract in I. Perez Sur.	T.D. 1,154 ft.; waiting for pump.
O. N. Beer's No. 1 S. W. Kearney, 150 ft. from S and E lines of 23-ac. tract in S. C. I. Peres Sur.	Spudded in.
R. S. Boling's No. 1 J. J. Appelt, 150 ft. from N and W lines of tract in M. Uriegas Sur.	T.D. 830 ft; pulling csg.
E. R. Byrd's No. 1 W. H. Russell, 750 varas from NE line, 54 varas from NW line of Fernandez Rodriguez Sur.	T.D. 1,340 ft; drlg. Buda lime.
LaSalle Oil Co.'s No. 1 City Sewage farm, 150 ft. S of Rilling Road, 450 ft. W of NE cor. of tract in D. Bustillos Sur.	Spudded in.
Motes-Campbell's No. 1 Pruitt, 550 ft. NE of Trussell's No. 1 Pruitt, 54 varas from E line of tract in Samuel McCollough Sur.	T.D. 1,065 ft.; running lines.
O. L. Ray's No. 1 Thos. Dillon, 3,500 feet from NW line, 1,750 ft. from most southerly SW line of de Luna grant in southern part of county	T.D. 680 ft.; drlg.
J. Morgan Russell's No. 2 Brotze, 200 ft. W of No. 1, in Cordenas Sur.	T.D. 340 ft.; drlg.
Earl S. Post's No. 1 Bilhartz, 1,265 ft. from W line, 2,169 ft. from S line of 335-ac. tract in F. Rolen Sur. No. 48	T.D. 784 ft; making heads.
Tipton's No. 1 Gembler, 514 ft. from W line, 616 ft. from N line of 120-ac. tract in M. Gotari Sur.	Spudded in.
Milo Trussell's No. 1 K. K. Harring, in J. Cantu Sur.	T.D. 1,350 ft.; S.D.
BLANCO COUNTY	
H. T. McGee's No. 1 Glasscock, center Sur. 167	T.D. 1,580 ft; fishing for fishing tools.
CALDWELL COUNTY	
F. L. Thomson's No. 1 Lawler, 150 ft. from NW line, 150 ft. from E of road in James Berry Sur.	T.D. 2,045 ft; standing 1,500 ft. in oil.
DUVAL COUNTY	
M. J. Coffey's No. 1 Parr, 591 ft. from W line, 270 ft. from N of NW cor. of Sec. 2, located in Sur. 27	Derrick.
Coronado Oil Co.'s No. 1 Wood-Welder, 1,980 ft. from W line, 950 ft. from N line of Sur. No. 211	T.D. 1,360 ft.; drlg.
Frank Gravis' No. 3 Schallert, 2,300 ft. from E line, 800 ft. from N line, Sur. 255	T.D. 2,230 ft.; spudded in June 1, 1932.
Huff et al's No. 1 A. Roach 685 ft. from E line, 43 ft. from S line of Blk. 7, Sur. No. 457	T.D. 200 ft.; spudded in.
G. G. Mortimer's No. 1 Peal, 330 ft. from S and W lines of Sur. No. 752	Spudded in.
J. J. O'Hern's No. 1 Smith-Corkill, 3,300 ft. from NE line, 1,320 ft. from SE line of Sur. 491	T.D. 700 ft.; drlg.
Smith & Hunter's No. 1 Olivarez, 1,640 ft. from N line, 940 ft. from W line of Sur. No. 80	T.D. 3,620 ft.; abnd.

(Continued on Page 77)

Lightning Demonstration Truck Visits Many Towns

Lightning, packed in an automobile and trailer, is being taken to various cities of the United States, piloted by C. G. Archibald and W. W. Sproul, Jr., engineers of the Westinghouse Electric & Manufacturing Co. and the two men demonstrate for oil companies, electric utilities personnel and engineers how modern equipment for transmission apparatus has minimized the effects of lightning strokes and voltage surges on power systems.

Formerly the most destructive agency that confronted power system engineers was lightning disturbances. Recent engineering advances have developed surge-proof transformers, lightning arresters, de-ion protectors, and other equipment which so thoroughly guard electric systems that lightning, striking the line, or near it, no longer has the power to even make the lights in homes flicker.

Lightning, as produced on the trailer, is a figure of speech. It is "man-made" lightning, produced by a Westinghouse 280 kilovolt surge generator, which can be controlled and made to produce effects exactly like nature's thunderbolts.

The trailer, ingeniously equipped, includes not only the surge generator, with attendant equipment for producing surges, but also a complete equipment of a power distribution system. All the equipment leads from the generators of central stations, primary and secondary circuits, directly into the house, are installed. There is even a "Nofuse load center" which replaces the fuses ordinarily installed in a home and an outdoor detachable meter, latest development of the Westinghouse research laboratories that add to the convenience of electricity.

The demonstration truck visited Tulsa, Ponca City, Bartlesville, Oklahoma City and Lawton in Oklahoma and then continued on its way to towns in Texas and Louisiana. In Tulsa the demonstration was given before the Tulsa Engineers Club, composed chiefly of engineers in the service of various oil companies.

Hopes Now Centered on Second Tomball Test; Prospects of Two New Lower Coastal Fields

By NEIL WILLIAMS
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., May 22.—One of the two key wildcats being drilled by Magnolia Petroleum Co. at Tomball, northern Harris County, and on which much has been staked for proving production, is believed to have been removed from the running when it cored salt water sand where it should have been picking up the much expected pay. The other test, however, located 3 miles distant, may come up to expectations and save the name of the area, which has been played as a proven field. It cored into sand showing gas and some saturation and odor of light gravity distillate.

Magnolia Petroleum Co.'s No. 1 Martens, Joseph House Survey, the northernmost of the twin tests, was the one which went into salt water sand to a total depth of 5,671 feet in the Cockfield, the producing horizon of the Conroe Field, 20 miles to the northeast, and where prolific oil production had been confidently banked on. At latest report the hole was being reamed to bottom preparatory to possible deepening.

The southernmost test, No. 1 Kobs, 3 miles southwest of the Martens well in the lower J. M. Hooper Survey, is in sand at a total depth of 5,569 feet. As this is written it is standing awaiting orders but it is presumed casing will be run to test. A drill stem test was to have been made with bottom at 5,561 feet but instead another 8-foot core was taken and the test shut down.

The recent purchase by Humble Oil & Refining Co. of an undivided half interest in these wells and the entire 10,000-acre Magnolia block continues to be one of the chief topics of discussion and the reasons for the purchase still are much of a puzzle to many operators and particularly since the Martens test apparently is not in the picture. It is the writer's opinion, substantiated by that of others, that whether Tomball is wet or dry, the $1,000,000 paid by Humble is pretty good insurance against the protection of the company's extensive and valuable properties at Conroe. If Tomball is dry, the $1,000,000 can be charged very well to Conroe because Tomball, if productive and in the hands of others, no doubt would experience a development play greater than that of Conroe and might throw such a volume of new coastal oil on the coast as to depreciate materially Humble's investments at Conroe. Tomball has been played for a major field and competitive drilling, in view of the numerous small tract ownerships, was not to be desired.

Two New Fields?

Additional field development on the Gulf Coast the past week included the opening of what appear to be two new fields in the lower coastal country, one in Refugio County, and the other in Victoria County; extension of production of East Hackberry Dome, Cameron Parish, Louisiana, to the extreme northeast flank and the proving up of a new deep sand there; the encountering of oil and gas showings in a southern Colorado County wildcat; drilling into salt at Darrow, resulting in the proving of geophysical findings on another field, and the launching of new wildcatting in several areas.

In Refugio County, George E. Smith and others, known sometimes as the Greta Oil Co., have completed their No. 1 J. M. O'Brien, a wildcat in the Winfield Survey, as a 550-bbl. well in sand at 4,396-4,403 feet. On a 15-hour gauge the well flowed 346 bbls. of pipe line oil through a quarter-inch choke with a pressure of 528 pounds. Gravity of the oil is 21.5 degrees (corrected for temperature). This well, in entirely undrilled territory, is approximately 5 miles north of the Fox Field and about 9 miles north of the main Refugio Field and about 10 miles south of Humble Oil & Refining Co.'s O'Connor Pool of northern Refugio County, which is a part of the McFaddin district which takes in southern Victoria County and northern Refugio County.

Victoria County

Stoneleigh Oil & Gas Co.'s No. 1 E. B. Terrell, southwest corner of R. Manchola Survey No. 2, Victoria County, also has opened another new field in the lower coastal country. This well, 4 miles southeast of Victoria and 10 miles from the nearest production of any kind, is a wet gasser in a sand at 4,437 feet. It came in showing a pressure of 1,200 pounds on the tubing and also on the casing through a seven-thirty-second inch choke. The well is characteristic of the discovery wells of most of the other fields which have been found in that part of the coast.

East Hackberry

The Texas Company's No. 10-B State-Calcasieu Lake, 1,000 feet east and 200 feet north of the NE cor., Section 13-12s-10w, northeast side of the East Hackberry Dome, Cameron Parish, Louisiana, came in at 10:30 p. m. Friday night and in nine hours up to 7:30 a. m. Saturday flowed 975 bbls., or at the rate of better than 108 bbls. an hour, through a three-eighths inch choke, 630 pounds pressure, from a sand at a total depth of 7,267 feet. Gravity of the oil is reported 28.5 degrees although this seems rather low for a well of such depth.

This well opens production on the northeast flank as well as a new deep sand. It is about a mile across the dome from the original production on the dome which was developed along the south and southeast flank, and also about a mile around the dome from the deep production proved more recently on the northwest flank of the dome by the Union Sulphur Co. In the latter area there are three wells in a 6,000-foot sand. Two other wells in that sector drilled to a sand at 8,300 feet which showed oil but both were junked because of stuck drill pipe. Shallow sand and cap rock production also has been developed on top the East Hackberry Dome.

Darrow Prospect

Another geophysical prospect was added to the list of proven domes when Rio Bravo Oil Co., No. 1 Gumble at Darrow, Ascension Parish, drilled into rock salt at 6,052 feet. This is the forty-first such prospect at which salt has been encountered, bearing out the findings of the instruments. During the preceding week Esperson was proved up. Both prospects, however, have been productive. Rio Bravo Oil Co.'s No. 2 Community at Darrow, 1,760 feet south and 600 feet west of the discovery well, has been placed on the pump and is making around 40 bbls. daily from sand at 4,827 feet. It is the second well on the dome. The discovery well, completed last September as a 1,000-bbl. producer at 4,035 feet, is standing with bottom of the hole cemented back to 4,020 feet in an effort to shut off water which showed up in considerable volume. This well never was produced except for fuel due to the lack of outlet facilities. No. 1 Gumble, which drilled into salt, is the third test drilled by Rio Bravo Oil Co., which owns an undivided half interest with Gulf Refining Co. in 3,000 acres on the dome.

Brazoria County

At East Stratton Ridge, Brazoria County, Amerada Petroleum Corp. and Rycade Oil Corp.'s No. 3 Seaburn, in a sand at 4,405-4,500 feet, came in making some oil after the running of tubing, but shortly the Gulf of Mexico took possession and now the hole is being plugged back. It is believed the well, a wildcat, took in too much of the sand and that after plugging it will make a producer. It is approximately a mile east of where some small production once was proved in shallow sands on top the original Stratton Ridge Dome.

Colorado County

Plymouth Oil Co. (Benedum & Trees) encountered a sand showing oil and gas at 6,140-6,200 feet in its No. 1 Ream, a wildcat in the I.&G.N. Survey, Section 47, southern Colorado County. In a drill stem test it recovered 400 feet of oil cut mud and showed a pressure of 400 pounds through a three-eighths inch choke on the bottom and also with one on the bottom. Casing probably will be run to test. This test is over a mile south of the Coyle-Concord wet gasser, completed nearly a year ago, in a sand at 4,052 feet and which so far is the only producer. The Plymouth test, as well as another being drilled by Humble Oil & Refining Co. over a mile northwest of the gasser, failed to get production in sands found by the latter well. The Humble wildcat, which is being drilled as a part of an exploration program undertaken by that company in connection with a deal to purchase approximately 10,000 acres of the Coyle-Concord block, is drilling in shale below 6,195 feet.

Ariola Dome

Republic Production Co. and Houston Oil Co.'s No. 3 Ariola fee on the Ariola Dome, southeastern Hardin County, at latest report was still swabbing in an effort to bring it back in. The well, the second producer for the dome, flowed initially at the rate of 50 bbls. an hour from sand at 4,320 feet, in which 18 feet of 4¾-inch screen was set, but went dead.

Location of the well is 660 feet due south of Gulf Production Co.'s No. 1-A Kirby, a dry hole abandoned at 6,737 feet. A 5,980-foot test drilled by Republic and Houston Oil Co. 660 feet east of the Gulf dry hole also was dry. These three tests are a little less than a mile northwest of the discovery well, Republic and Houston's No. 1 Ariola fee, completed last August in a sand at 4,157 feet after plugging back from 4,324 feet, where salt was encountered. The discovery well flowed initially at the rate of 285 bbls. net oil with 400 bbls. of water. Production now is down to around 50

(Continued on Page 83)

Gulf Coast Fields and Wildcats

Week Ending May 20

RACCOON BEND—AUSTIN COUNTY

Company, farm and location—	Remarks:
Goodnight and Donald Oil Co.'s No. 1 Deitrich, Thos. Bell Sur., 200 ft. SE Flannagan et al's No. 1 Deitrich	Drlg. shale 2,588 ft.

DAMON MOUND—BRAZORIA COUNTY

Sinclair Prairie Oil Co.'s No. 31-A Bryan, 155 ft. N, 45 deg. E of SW cor. of Blk. 28, Masterson Subd., and 140 ft. S, 45 deg. E, A. Darst Sur.	T.D. 7,586 ft; no report.

MANVEL—BRAZORIA COUNTY

Alpha Oil Co.'s No. 1 Patterson, H. N. Little Sur., 150 ft. out of S cor. of 10-ac. tract (Lot 40)	Drlg. gumbo and lime 3,739 ft.
The Texas Co.'s No. 1-B Belcher, H. N. Little Sur., 300 ft. out of N cor. of "B" lease	Drlg. gumbo and lime 3,690 ft.
The Texas Co.'s No. 1 Davis, 250 ft. S 42 deg. W and 400 ft. N 48 deg. W out of E cor. of Lot 31, H. N. Little Sur.	Set 23 ft. screen 3,871 ft.; comp. 37 bbls. net oil hrly., 20% wash wtr.; ⅝-in. choke; 150 lbs. on tubing and 190 lbs. on csg.

BARBERS HILL—CHAMBERS COUNTY

Mills Bennett Prod. Co.'s No. 8-A "B" Wilburn (D.D.), Henry Griffith Sur.	Drlg. shale 4,576 ft.
Sinclair Prairie Oil Co.'s No. 10 Wilburn (D.D.), Wm. Hodges Sur.	Cutting and pulling screen to deepen 4,849 ft.
Sun Oil Co.'s No. 16 Wilburn, Henry Griffith League, 150 ft. W of No. 14 and 50 ft. N of S line	Drill pipe stuck 3,320 ft.
The Texas Co.'s No. 3 Lawrence fee, Henry Griffith League, 740 ft. W of E line in center of tract	T.D. 5,278 ft; sidetracked 1,400 ft.; drlg. salt 1,814 ft.
The Texas Co.'s No. 9 Wilburn, Henry Griffith League, 580 ft. E of NW cor. and 50 ft. S of N line	Set 43⅝ ft. of 4½-in. csg. 4,186 ft.; comp. 25 bbls. per hr.; 41/64-in. choke.
Yount Lee Oil Co.'s No. 23 Chambers County, Wm. Bloodgood Sur., 300 ft. from W line, 262½ ft. from N line of lease	Hard rock 1,880 ft.; cmtd. 10¾-in. csg. on bottom.

RABBS RIDGE—FORT BEND COUNTY

Cullen & West's No. 1 Gehr, Samuel Kennedy Sur., 330 ft. N, 1,000 ft. E of NW cor. Hamerstram 291-ac. tract	Drlg. shale and lime 5,915 ft.
Cullen & West's No. 2 Whitmore, Samuel Kennedy Sur., 476 ft. W of No. 1 and 350 ft. N of S line	Drlg. 1,300 ft.
Gulf Prod. Co.'s No. 8 Gubbels, Samuel Kennedy Sur.	Sand 5,340 ft.
Humble O. & R. Co. and Gulf Prod. Co.'s No. 14-A F. I. Booth, Samuel Kennedy Sur., 398 ft. E of No. 7	Comp. flowing 45 bbls. daily; ⅝-in. choke, 5,320 ft.
Humble O. & R. Co. and Gulf Prod. Co.'s No. 15-A F. I. Booth, 7,040 ft. E along S line of lease from NW cor. of E ½ of J. Rabb Sur. and 467 ft. N at right angles	Comp. 50 bbls. per hour; ⅝-in. choke, 5,300 ft.
Humble O. & R. Co.'s No. 16-A F. I. Booth, Samuel Kennedy Sur., 932 ft. E of No. 6	Drlg. gumbo 904 ft.
Humble O. & R. Co.'s No. 7 T. R. Booth, J. Rabb Sur.	Drlg. shale 875 ft.

Drilling Play at Huntington Beach Is Under Way; Mountain View Area Definitely Proved Up

By L. P. STOCKMAN
Staff Correspondent, California Fields

LOS ANGELES, Calif., May 20.—The Huntington Beach Field of Los Angeles Basin is back in the spotlight after an extended period of inactivity and will probably be the hot spot in California during the next several months. This field is not expected to cause any serious disturbance from a production standpoint, although we may logically anticipate a gain in production during the summer months. The rejuvenation of this field is due to a revival of drilling operations in the Seventeenth Street town lot area where approximately 25 strings of tools are expected to be in operation within the next 30 days. The last well finished in this area was the Macroo Oil Co.'s No. 1 Smith, which came in flowing 2,570 bbls. of clean 24.8 gravity oil and 2,000,000 feet of natural gas per day from 4,450 feet. The production of this well subsequently built up to 3,900 bbls. of exceptionally clean oil and 5,500,000 feet of natural gas per day.

New Work

Several wells have already been started in the competitive drilling campaign in Huntington Beach Field and preparations have been completed to start work on a number of others in the immediate future. E. E. Combs is building rig for a new well to be drilled on the Lowder property and is rigging up rotary equipment to begin redrilling operations on No. 1 McIntyre, which has been producing until recently from 4,406 feet. Doyle & McKeon are sidetracking in well No. 1 at 2,550 feet with the bottom of the hole at 4,435 feet. George F. Getty, Inc., is repairing the rig on No. 5 Huntington and will start redrilling operations within another week or 10 days. Sam Brooks has taken over J. E. O'Donnell's No. 1 Lambert, bottomed at 4,379 feet, and is rigging up to redrill. The Hammil Oil Co. and Rowan and Richards are building rigs for No. 2 Lewis and No. 1 Severns preparatory to early work. The Wilshire Oil Co., which this week completed No. 6-A Huntington pumping 220 bbls. of 22.2 gravity oil cutting 30 per cent from 4,415 feet, is building a new rig for well No. 15 and is expected to spud in some time during the course of the next 10 days. The Sierra Huntington Oil Co. and the Southern California Drilling Co. are already well under way and should consequently list their respective completions some time within the next two weeks. There are at the present time 15 wells going down and over in the Seventeenth Street town lot area an equal number is scheduled to be started in the very near future. It has been several years since California operators have removed dwelling houses to facilitate drilling operations but it did not take the Wilshire very long to demolish its Huntington Beach warehouse and another operator to place a cottage on wheels when these structures interfered with drilling operations at Huntington Beach.

Mountain View

Mountain View, which for many years has been termed the Weed Patch area, was definitely proved up as a new oil field in California by Dana Hogan's No. 1 Wharton, which came in over the last week end flowing 2,750 bbls. of exceptionally clean 24.6 gravity oil and 2,500,000 feet of natural gas per day from 5,864 feet. This well, which was plugged back from 5,884 feet, was finished with a 9⅝-inch water string landed at 5,800 feet and 4¾-inch liner carrying 61 feet of perforated. The well is showing an exceptionally low gas-oil ratio and is flowing through a one-half inch bean under a pressure of 300 pounds on the tubing and 650 pounds on the casing. Production has been pinched back, in conformity with the curtailment program to 1,650 bbls. per day with current production going to the Lake View Oil & Refining Co.'s plant near Fellows in the Midway-Sunset area. No pipe line connections have been made with the Mountain View Field, which is located in the extreme southern part of the San Joaquin Valley, but an extension is expected to be laid either to the General Petroleum, Richfield or Union Oil Co. pipe line facilities in the near future as all three of these marketers have main trunks located within a 10-mile radius. The Mohawk Petroleum is still working on No. 1 Hood in the Mountain View Field in an effort to complete the well as a commercial producer. This project blew in early in May as a gas well but subsequently sanued up after bridging over at approximately 5,100 feet. The showing of this well and the relatively large production developed by Dana Hogan will probably result in additional development of the Mountain View Field within the next 90 days.

Coal Oil Point

J. J. (Jack) Doyle, who is drilling a second test on tideland permit No. 191 in the Coal Oil Point area of Santa Barbara County in conjunction with the Bolsa Chica Oil Co., started to drill out the cement this morning and an early production test is expected to be conducted. The second well on tideland permit No. 191 is located 400 feet north of the Bolsa Chica's initial test, which was a duster in both the Vaqueros and Sespe, due partly to inefficient drilling, and has cored approximately 5 feet of exceptionally well saturated oil sand. The last 5 feet was solid oil sand and if approximately 50 feet of similar sand can be opened up, California should have another new oil field at Coal Oil Point. The Doyle-Bolsa Chica test looks like almost a sure shot and has all the earmarks of a commercial producer, provided of course that a little more formation is opened up. These operators control all of the potentially productive acreage on the Coal Oil Point structure and if a field is opened up will develop the area by constructing caissons at Los Angeles Harbor and tow these well heads to Coal Oil Point. The Coal Oil Point area located a few miles east of the prolific Ventura Avenue Field will bear watching during the course of work in the next few weeks as this wildcat exploration work looks particularly hot.

Kettleman Hills

The North Kettleman Oil & Gas Co. has resumed drilling operations in No. 1 Lillis-Welsh, an outpost located in the extreme western end of the North Kettleman Hills structure, and should, barring mechanical trouble, be in a position to conduct a production test within the next few weeks. The bits in this well should average at least 25 feet per day as the formation has softened up somewhat and is therefore conducive of better footage. It is the present intention of Ed McAdams to make 11,000 feet of hole before entertaining any thought of concluding drilling operations, unless of course geological conditions justify the previous suspension of work. Drilling has been resumed at 10,927 feet, from which depth the well showed sufficient kick to justify the expectation of developing commercial production. It might not be amiss to say that No. 1 Lillis-Welsh may be carried down substantially deeper than the 11,000-foot level, as Mr. McAdams is confident that he can reach a depth of 12,000 feet with camparative safety if necessary. It is believed probable, therefore, that this deep outpost will undoubtedly be carried down below 11,000 feet before the conclusion of drilling.

Completion of No. 1 Lillis-Welsh will probably add 5,000 acres of productive oil land in the Kettleman North Dome Field and confirm the expectation of developing similar Eocene production in the Kettleman Middle Dome Field. If the North Kettleman Oil & Gas Co.'s outpost is completed as a substantial producer, the Kettleman North Dome Association will probably resume drilling operations in well No. 36-30-J which was suspended some time ago at 9,303 feet. This project of Kenda is located between the red and blue lines in Section 30-21-17 and may not be as hopeless as preliminary surveys indicated. If the deep outpost on the Lillis-Welsh property is completed in the Eocene it will tend to disrupt preliminary estimates governing the productive and potentially productive acreage in the North Dome and may lead to additional drilling by Kenda between the red and brown lines and the brown and blue lines, as it would prove rather costly to Kenda if the outer, or blue line was drawn too conservatively. During the early part of the past week the Kettleman North Dome Association successfully completed well No. 87-30-J flowing 2,875 bbls. of exceptionally clean 36.3 gravity oil and approximately 3,000,000 feet of natural gas per day from 8,919 feet. The well was subsequently beaned back to 2,088 bbls. of clean 35.1 gravity oil and 1,225,000 feet of natural gas daily.

Lost Hills-Belridge

The Belridge Oil Co. finished one of the best producing wells completed in the North Belridge Field of Kern County when well No. 63-27 was brought in a few days ago flowing 4,090 bbls. of clean 39.1 gravity oil and approximately 5,000,000 feet of natural gas per day. This new well, finished in the Temblor and bottomed at 5,402 feet, was completed with a 6⅝-inch liner including 452 feet of perforated. This project is an offset to well No. 64-27, the company's deep zone completion in the Eocene at 8,062 feet. The Associated Oil Co. has encountered a rather hard shale in No. 1 Williamson, a deep test which the company is drilling in the Lost Hills Field of Kern County in conjunction with the Richfield Oil Co. and has resorted to the use of a Reed roller bit to facilitate drilling.

Two wells were completed in the Mount Poso Field of Kern County during the current week, but neither of the projects in question succeeded in developing production comparable with that secured by the Shell Oil Co. in its two deep wells finished a few months ago. No. 10 Heisen of the General Petroleum, bottomed at 1,785 feet, plugged back to 1,740 feet and finished with a 6⅝-inch liner carrying 152 feet of perforated, was brought in pumping 405 bbls. of 16.7 gravity oil per day. No. 3 Glide of The Texas Company was completed on the beam pumping 420 bbls. of 16.2 gravity oil cutting 20 per cent from 1,754 feet following completion of the well with an 8⅝-inch combination string carrying 134 feet of perforated and cemented through perforations at 1,620 feet. Bert Brunwin and Pongratz Oil Co. are rigging up rotary equipment preparatory to undertaking additional drilling in the Mount Poso Field. In the Midway-Sunset area, the Union has finally succeeded in completing No. 1 Keene pumping 165 bbls. per day from 1,505 feet, but is still experiencing a little difficulty with sand trouble. The Honolulu Consolidated, which is making preparations to complete No. 54 in the Midway-Sunset area, has started rig construction for Nos. 35 and 65 to be drilled in Section 8-32-24. The General Petroleum has just started drilling operations on No. 1 Lovitt, an outpost located north and a little west of the McKittrick Field of Kern County, and this well may bear

TANKER SHIPMENTS FROM LOS ANGELES TO DOMESTIC AND FOREIGN PORTS

	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last year
Intercoastal-domestic—						
Crude oil	.....	.....	.....	.....	78,085	.....
Fuel oil	.....	.....	148,721	21,246	591,444	.....
Diesel and gas oil	70,980	10,140	.....	.....	1,085,064	116,890
Gasoline	529,136	75,591	116,930	16,704	3,045,534	2,532,978
Kerosene	.....	.....	.....	.....	411,076	103,895
Foreign exports—						
Crude oil	278,284	45,469	56,979	8,140	2,624,951	3,112,380
Fuel oil	98,434	14,062	231,681	33,097	2,578,841	2,595,004
Diesel and gas oil	197,119	28,160	61,519	8,788	1,243,413	814,064
Gasoline	.....	.....	145,026	20,718	2,068,234	3,589,024
Kerosene	.....	.....	25,236	3,605	632,289	335,407
Naphtha distillates	.....	.....	.....	.....	.....	75,425
Coastwise-domestic—						
Crude oil	112,591	16,084	.....	.....	2,963,681	5,126,950
Fuel oil	50,080	7,154	94,895	13,556	3,481,027	5,133,935
Diesel and gas oil	7,077	1,011	27,295	3,899	522,732	585,513
Gasoline	260,170	37,167	374,289	53,470	4,404,731	5,538,114
Kerosene	.....	.....	14,051	2,009	81,184	63,566
Naphtha distillates	.....	.....	.....	.....	27,651	.....

TANKER SHIPMENTS FROM SAN FRANCISCO TO DOMESTIC AND FOREIGN PORTS

Intercoastal-domestic—						
Diesel and gas oil	.....	.....	.....	.....	280,531	151,220
Gasoline	12,100	1,729	39,210	5,601	290,326	323,455
Kerosene	.....	.....	.....	.....	406,405	.....
Lubricants	.....	.....	8,150	1,164	16,400	15,824
Foreign exports—						
Crude oil	.....	.....	.....	.....	629,722	635,430
Fuel oil	.....	.....	.....	.....	252,511	521,659
Diesel and gas oil	.....	.....	2,493	357	414,679	353,107
Gasoline	44,150	6,307	92,225	13,175	1,699,388	1,410,916
Kerosene	41,350	5,907	15,115	2,159	385,233	340,042
Lubricants	5,250	750	1,075	154	19,397	20,884
Coastwise-domestic—						
Fuel oil	80,853	11,550	74,871	10,696	1,013,780	941,454
Diesel and gas oil	.....	.....	.....	.....	153,941	187,104
Gasoline	26,131	4,019	46,146	6,878	1,213,237	1,316,535
Kerosene	.....	.....	.....	.....	57,531	44,295
Lubricants	2,751	393	.....	.....	2,751	.....

watching during the course of work as the structure on which it is located appears to have considerable merit.

Long Beach

Well No. 11 of the Woods Callahan Oil Co., completed last week, is at present flowing 535 bbls. of exceptionally clean 24.6 gravity oil and 440,000 feet of natural gas per day. This project, together with other recent completions, has prevented daily production of the Long Beach Field from continuing its normal decline. S. D. Contes' No. 1-A Britsch, plugged back to 5,030 feet, and the casing perforated at 4,995-5,030 feet, has been completed flowing 554 bbls. of relatively clean 25.1 gravity oil per day. The R. R. Bush Oil Co. has staked locations for No. 1 fee and No. 1 I. P. C., two new projects to be started in the Long Beach Field in the immediate future. J. E. O'Donnell's latest completion in the Long Beach Field was No. 2 Walker, bottomed at 5,180 feet and brought in doing 421 bbls. of unusually clean 24.6 gravity oil per day, following completion of the hole with a 4½-inch combination string including 201 feet of perforated. No. 3 Vidor of the Union Oil Co. in the Playa Del Rey Field has been completed doing 175 bbls. of 21.9 gravity oil per day on a compressor from 6,098 feet.

JAMES HILLIS DIES

CHATHAM, Ontario, May 20.—James Hillis died at Petrolia, Ontario, recently in his eighty-eighth year. In his earlier days he was associated with the oil industry in Petrolia, being on the staff of J. H. Fairbank, oil operator.

ITALIAN AVIATION FUEL

Italy has approved the sale of a fuel containing absolute alcohol, aviation gasoline, benzol, acetone, ether and castor oil, according to a report to the Commerce Department from Rome. Trade circles expect the new fuel to be used in airplane engines. Name of fuel is "Velox."

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Company, well and location—	S-T-R	Depth	Status
Fairview Oil Co., No. 1-A Purisima, Santa Barbara Co.	18- 7-34	1,594	suspended
Listle, K. L., No. 1 Purisima, Santa Barbara Co.	32- 8-34	grade	suspended
Standard Oil Co., No. 1 Goleta, Santa Barbara Co.	26- 4-28	rig	rigged up
Duell, O. S., No. 1 Naples, Santa Barbara Co.	7- 4-29	5,132	suspended
Equity Oil Co., No. 1 Coal Oil Point, Santa Barbara Co.	24- 4-29	3,750	suspended
Bolsa Chica, No. 1 Coal Oil Point, Santa Barbara Co.	tideland	4,089	suspended
Bolsa Chica, No. 2 Coal Oil Point, Santa Barbara Co.	tideland	4,082	very promising
Cuyama Oil Co., No. 1 Cuyama, Santa Barbara Co.	12-10-27	2,387	suspended
Woodrow Pet., No. 1 Rincon, Ventura Co.	4- 3-24	7,292	cemented
Indian Pet., No. 1 Rincon, Ventura Co.	tideland	3,484	prod. test
Commander Oil Co., No. 1 Fillmore, Ventura Co.	13- 4-19	2,400	suspended
Hancock Oil Co., No. 1 Fillmore, Ventura Co.	13- 4-19	1,232	suspended
Honolulu Consolidated, No. 1 Miguelito, Ventura Co.	23- 3-24	6,200	hd. sh. drilling
Continental, No. 2 Miguelito, Ventura Co.	23- 3-24	5,187	sd. sh. drilling
C. C. M. O., No. 3-A Miguelito, Ventura Co.	23- 3-24	2,908	hd. sd. drilling
Midlands Pet., No. 1 Ojai, Ventura Co.	9- 3-23	6,170	gr. sh. drilling
Macrate, A. N., No. 1 Ojai, Ventura Co.	27- 4-23	2,071	suspended
Wilshire Oil Co., No. 1 Sulphur Mountain, Ventura Co.	26- 4-21	1,863	recemented
Mosher, J. W., No. 1 Santa Paula, Ventura Co.	22- 4-21	1,127	gr. sd. drilling
Duell, O. S., No. 1 Timber Canyon, Ventura Co.	31- 4-20	316	suspended
Petro Producing Co., No. 1 Timber Canyon, Ventura Co.	18- 4-20	4,076	hd. sd. drilling
Las Posas Pet., No. 1 Las Posas, Ventura Co.	22- 3-20	2,979	suspended
Wilshire Oil Co., No. 1 Bardsdale, Ventura Co.	12- 3-20	1,732	suspended
International Oil Developers, No. 1 Conejo, Ventura Co.	33- 2-20	2,770	pumping test
Anderson, C. L., No. 1 Santa Susana, Ventura Co.	36- 3-18	1,115	sd. sh. drilling
Hub Pet. Co., No. 1 Gould Hills, Kern Co.	22-29-21	5,460	hd. sh. drilling
Purman, T. H., No. 2 Gould Hills, Kern Co.	27-29-21	335	suspended
General Pet., No. 1 McKittrick, Kern Co.	10-30-21	121	sd. drilling
Casa Mera Oil Co., No. 1 Belridge, Kern Co.	29-28-20	2,191	br. sh. drilling
General Pet., No. 1 Belridge, Kern Co.	30-28-21	8,260	suspended
Milham Exploration Co., No. 24 Buttonwillow, Kern Co.	5-28-23	2,625	suspended
Cumberland Oil Co., No. 2 Devils Den, Kern Co.	17-26-18	3,270	suspended
Holloway, A. S., No. 1 Devils Den, Kern Co.	11-25-18	1,648	suspended
Lincoln Pet., No. 1 Devils Den, Kern Co.	10-25-18	1,190	sd. sh. drilling
Hanna, Tom, No. 1 Devils Den, Kern Co.	25-25-18	3,516	suspended
Pyramid Hills Oil Co., No. 1 Devils Den, Kern Co.	24-25-18	3,660	br. sh. drilling
Fowler, F., No. 1 Blackwell Corner, Kern Co.	15-26-19	3,170	suspended
Rio Cal Pet., No. 1 Shale Hills, Kern Co.	2-27-18	2,255	suspended
Associated, No. 1 Lost Hills, Kern Co.	2-26-20	3,592	hd. sh. drilling
Seminole Oil Co., No. 1 Lost Hills, Kern Co.	29-25-21	rig	suspended
Caravel Pet. Co., No. 1 Edison, Kern Co.	19-30-30	660	sd. sh. drilling
Mohawk Pet., No. 1 Weed Patch, Kern Co.	30-30-29	5,958	prod. test
Hogan, Dana, No. 1 Weed Patch, Kern Co.	32-30-29	5,884	flow 2,850B/D
Descanso Oil Co., No. 1 Wheeler Ridge, Kern Co.	31-11-19	2,620	suspended
Gatton & Luethe, No. 1 Madera, Madera Co.	22-10-17	2,311	sd. sh. drilling
Bergman, Harry, No. 1 Kingsburg, Fresno Co.	12-12-21	4,023	suspended
Graham & Loftus, No. 1 Raisin City, Fresno Co.	20-15-18	5,360	gr. sd. drilling
Emerich Oil Co., No. 1 Mendota, Fresno Co.	35-13-13	2,264	sd. sh. drilling
Hogan, Dana, No. 1 Joaquin Ridge, Fresno Co.	28-20-16	mtl.	building rig.
Kent & McDonald, No. 1 Carriso Plains, San Luis Obispo	3-32-32	3,830	fishing
Paso Robles Oil Co., No. 1 Edna, San Luis Obispo Co.	27-27-11	4,191	suspended
Guess, E. B., No. 1 Corcoran, Kings Co.	7-21-21	6,197	suspended
Brown, A. M., No. 1 Cloud, Kings Co.	10-23-19	1,305	bl. sh. drilling
Dudley Dome Oil Co., No. 1 Dudley Ridge, Kings Co.	9-23-20	3,012	suspended
Tulaco Oil Co., No. 1 Ridge, Kings Co.	20-22-20	2,000	suspended
Knudsen & Schmidt, No. 1 Reef Ridge, Kings Co.	26-22-17	6,873	suspended
Kettleman Ridge Oil Co., No. 1 Avenal, Kings Co.	10-22-16	312	suspended
Magee & Stone, No. 2 Alpaugh, Kings Co.	33-24-22	rig	suspended
Dil-Harp Oil Co., No. 1 Delano, Tulare Co.	25-24-26	1,210	bl. sh. drilling
Na-Pa Oil Co., No. 1 Griffith, Napa Co.	7- 8- 3	3,720	br. sh. drilling
Oakdale Oil Co., No. 1 Oakdale, Stanislaus Co.	5- 2-10	4,813	redrilling
Rushing Oil Co., No. 1 Waterford, Stanislaus Co.	20- 3-13	2,631	suspended
Pacific Northern Oil Co., No. 1 Guinda, Yolo Co.	23-12- 3	3,401	br. sd. drilling
Buttes Oilfields Co., No. 1 Marysville, Sutter Co.	35-16- 1	2,731	gas, shut in.
Buttes Oilfields Co., No. 2 Marysville, Sutter Co.	34-16- 1	902	sd. sh. drilling
D. & S. O. Synd., Well No. 1, Glenn Co.	29-22- 5	rig	suspended
Tehama Pet. Co., Well No. 1, Glenn Co.	4-22- 5	3,790	gas showing
Orland Synd., No. 1 Orland, Tehama Co.	31-23- 3	3,748	suspended
Marker Drlg. Co., No. 1 Orland, Tehama Co.	31-25- 5	3,030	suspended

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Company, well and location—	S-T-R	Depth	Status
Palm Ridge Oil Co., No. 1 Palms, Los Angeles Co.	2- 2-15	4,960	hd. sd. drilling
Baldwin Oil Co., No. 9 Inglewood, Los Angeles Co.	7- 2-14	5,863	suspended
Kupfer, A. M., No. 1 Inglewood, Los Angeles Co.	17- 2-14	5,353	suspended
Pacific Gulf, No. 1 Athens, Los Angeles Co.	19- 3-13	6,094	suspended
Pacific Oil Inv. Co., No. 1 Wilmington, Los Angeles Co.	28- 4-13	3,640	prod. test.
Wilmington Oil Co., No. 1 Wilmington, Los Angeles Co.	28- 4-13	3,646	pump. 75 B/D
Peoples Oil & Gas Co., No. 1 Compton, Los Angeles Co.	31- 3-12	rig	rigged up.
Oakes & Mead, No. 1 Lyndwood, Los Angeles Co.	31- 3-13	4,940	cleaning out
Community Oil Co., No. 1 Montebello, Los Angeles Co.	34- 1-11	5,200	suspended
Universal Consd., No. 1 Montebello, Los Angeles Co.	5- 2-11	5,372	gr. sd. drilling
Andrus & Hutcheson, No. 1 El Monte, Los Angeles Co.	11- 1-11	2,197	reaming
Willetts Pet., No. 1 Saugus, Los Angeles Co.	35- 5-16	2,074	circulating
Smith, J. A., No. 1 Saugus, Los Angeles Co.	33- 5-17	3,515	suspended
Alpha Oil Co., No. 1 Calabasas, Los Angeles Co.	22- 1-18	969	suspended
Hudson Pet., No. 1 Newhall, Los Angeles Co.	1- 3-16	1,530	hd. sd. drilling
Ball, W. Z., No. 1 Newhall, Los Angeles Co.	34- 3-16	3,552	suspended
Big Four Oil Co., No. 2 Newhall, Los Angeles Co.	33- 4-16	3,320	suspended
Marble, Willard, No. 1 Van Nuys, Los Angeles Co.	6- 2-16	2,000	test W.S.O.
Nuoil Co., No. 1 Newport, Orange Co.	29- 6-10	3,901	suspended
Mineral Exploration, No. 1 Capistrano, Orange Co.	8- 8- 7	4,302	suspended
Aiken & Bailey, No. 1 El Toro, Orange Co.	3- 6- 7	rig	suspended
Placentia Dev. Co., No. 1 Placentia, Orange Co.	31- 3- 9	rig	rigged up
Spindletop Oil Co., No. 1 Salton Sea, Riverside Co.	35- 7-10	3,590	suspended
Keeley, E. J., No. 1 Corona, Riverside Co.	21- 4- 6	704	reaming
Duncan, N. L., No. 1 Sagebrush, Riverside Co.	8- 4- 6	1,157	suspended
Great American Pet., No. 1 Chino, San Bernardino Co.	18- 2- 8	1,990	hd. sd. drilling
Great American Pet., No. 2 Chino, San Bernardino Co.	18- 2- 8	rig	suspended
McCarthy, C. F., No. 1 Chino, San Bernardino Co.	14- 3- 6	rig	portable rot.
Mason Oil Co., No. 1 Salton Sea, Imperial Co.	1-17-15	680	suspended
Woods, D. H., No. 1 Salton Sea, Imperial Co.	7-11-16	774	suspended

Summary of California Oil Field Operations for March, 1933

According to figures collected by the American Petroleum Institute, the total production of crude oil in California for March amounted to 13,414,980 bbls., an average of 432,741 bbls. per day.

Due to inventory adjustments by a reporting company as of December 31, 1932, 1,000,000 bbls. of heavy crude and fuel stocks should be deducted from reports previously published. This deduction does not represent consumption. Following are the corrected figures:

Dec. 31, 1932, heavy crude and fuel, 100,174,293; total all stocks, 167,246,425 bbls.
Jan. 31, 1933, heavy crude and fuel, 99,796,706; total all stocks, 166,416,484 bbls.
Feb. 28, 1933, heavy crude and fuel, 99,060,173; total all stocks, 165,905,039 bbls.

CRUDE PETROLEUM PRODUCTION

(Figures of production and stocks are in barrels of 42 gallons)

	Barrels per month	Daily average Mar., 1933	Daily average Feb., 1933	Daily average Mar., 1932
Group No. 1—				
Coalinga	327,375	10,557	10,596	8,706
Elk Hills	394,647	12,731	12,925	12,706
Fruitvale	156,592	5,051	5,037	3,647
Kern River	272,990	8,806	9,022	10,033
Kettleman Hills-North Dome	1,845,562	59,534	57,526	59,892
Kettleman Hills-Middle Dome	.....	.....	.....	.....
Lost Hills-Belridge	291,248	9,395	9,347	9,227
McKittrick	52,540	1,695	1,741	1,795
Midway-Sunset	1,468,791	47,381	47,338	49,282
Mount Poso	273,110	8,810	8,191	7,980
Round Mountain	93,042	3,001	2,907	2,811
Wheeler Ridge	14,149	456	475	507
Group No. 2—				
Capitan	915	29	.....	.....
Elwood	414,928	13,385	13,462	16,428
Rincon	62,458	2,015	2,064	1,653
San Miguelito	31,842	1,027	967	458
Santa Barbara	21,718	700	667	299
Santa Maria	89,380	2,883	2,783	2,626
Summerland	3,101	100	101	108
Ventura Avenue	1,123,484	36,241	37,292	30,868
Ventura-Newhall	99,317	3,204	3,144	3,641
Watsonville	1,887	61	62	62
Group No. 3—				
Coyote	236,279	7,622	9,867	10,392
Domingues	395,010	12,742	13,081	19,973
Fullerton (Brea Olinda)	212,072	6,841	7,772	8,322
Huntington Beach	641,386	20,690	25,496	21,903
Inglewood	304,001	9,806	12,124	13,735
Lawndale	8,242	266	267	284
Long Beach	1,924,747	62,089	70,105	82,574
Los Angeles-Salt Lake	24,684	796	920	1,156
Montebello	135,738	4,056	4,708	6,396
Newport	.....	.....	.....	4
Playa Del Rey	348,137	11,230	12,336	18,294
Potrero	14,173	457	574	695
Richfield	157,823	5,091	6,172	6,302
Rosecrans	71,291	2,300	2,995	3,123
Santa Fe Springs	1,509,181	48,686	52,562	65,857
Seal Beach	195,081	6,293	11,114	13,162
Torrance	179,250	5,782	6,263	6,356
Whittier	28,909	932	1,106	1,191
Total March	13,414,980	432,741	468,109	502,449
Total February	13,107,043	468,109		
Decrease	*307,937	35,368		

*Increase.

TOTAL STOCKS HELD BY CALIFORNIA OIL COMPANIES, BOTH INSIDE AND OUTSIDE THE UNITED STATES

	Mar. 31, 1933	Feb. 28, 1933	Mar. stock decreases	Mar. 31, 1932
Heavy crude and all grades of fuel, gas and Diesel oils	98,795,332	99,060,173	264,841	97,992,316
Refinable crude	39,913,999	39,867,508	†46,491	42,154,553
Finished gasoline, engine distillate and natural gasoline	15,601,273	15,538,326	†62,947	17,646,369
Crude gasoline and naphtha distillates	4,482,681	4,734,357	251,676	4,809,449
All other stocks	*6,819,043	‡6,704,675	*114,368	$7,886,300
Total all stocks	165,612,328	165,905,039	292,711	170,488,987
†Increase. Barrels of coke included	*693,822	‡655,131		$659,420

OIL FIELD DEVELOPMENT

	New rigs up	Active drilling	Producers completed	Daily initial output	Active producing	Abd. wells Drillers	Abd. wells Producers
Group No. 1—							
Coalinga	0	0	0	0	641	0	0
Elk Hills	0	0	0	0	199	0	0
Fruitvale	2	2	1	405	52	0	0
Kern River	0	1	0	0	950	0	1
Kettleman North Dome	0	13	1	3,774	35	0	0
Kettleman Middle Dome	0	0	0	0	0	0	0
Lost Hills-Belridge	1	2	1	1,500	145	0	0
McKittrick	0	0	0	0	115	0	0
Midway-Sunset	1	2	0	0	1,750	0	0
Mount Poso	0	4	0	0	99	0	0
Round Mountain	0	0	0	0	22	0	0
Wheeler Ridge	0	0	0	0	34	0	0
Group No. 2—							
Capitan	0	0	0	0	2	0	0
Elwood	0	0	0	0	46	0	0
Rincon	0	1	0	0	34	0	0
San Miguelito	0	2	0	0	2	0	0
Santa Barbara	0	3	0	0	3	0	0
Santa Maria	0	1	0	0	160	0	0
Summerland	0	0	0	0	63	0	1
Ventura Avenue	0	4	1	2,263	158	0	0
Ventura-Newhall	0	11	1	150	440	1	0
Watsonville	0	0	0	0	6	0	0
Group No. 3—							
Coyote	0	2	0	0	85	0	0
Domingues	1	4	0	0	56	0	0
Fullerton	0	0	0	0	355	0	0
Huntington Beach	1	2	0	0	401	0	1
Inglewood	0	1	0	0	215	0	0
Lawndale	0	0	1	50	7	0	0
Long Beach	1	19	3	1,031	948	0	0
Los Angeles-Salt Lake	0	0	0	0	195	0	2
Montebello	0	2	0	0	150	0	0
Newport	0	0	0	0	0	0	0
Playa Del Rey	1	2	0	0	200	0	2
Potrero	0	0	0	0	12	0	0
Richfield	0	0	1	220	157	0	0
Rosecrans	0	1	0	0	61	0	0
Santa Fe Springs	0	0	0	0	513	1	0
Seal Beach	0	0	0	0	102	0	1
Torrance	0	0	0	0	330	0	0
Whittier	0	0	0	0	140	0	0
Miscellaneous drilling	3	25	0	0	0	4	0
Group No. 4—							
Buttonwillow gas field	1	1	0	0	2	0	0
Dudley Ridge gas field	1	1	0	0	0	0	0
Goleta gas field	0	0	0	0	0	0	0
Total March	13	109	10	9,393	5,940	6	5
Total February	33	117	19	17,109	5,953	6	27
Decrease	10	8	9	7,716	13	0	19

Central Ohio Most Active Central West Field; Four Completions Reported in Michigan

By GEORGE A. WHITNEY
Staff Correspondent, Central West Fields

FINDLAY, Ohio, May 22.—Owing to recent rains over the Central West Fields, very few completions were reported from any of the divisions. Indiana and Illinois failed to report any new wells brought in and what completions were made came from the Lima Field, Central Ohio and Kentucky.

In the Lima Field of Northwestern Ohio, two completions were made, both being in Crane Township, Wyandot County, the largest being McPheron and others' No. 2 on the Carl Smith farm, Section 33, reported as 60 bbls. initial from the Trenton lime. Upper Sandusky Oil & Gas Co.'s No. 1 on the Mary Loverick farm, Section 28, same township, that showed for gas, was drilled deeper and produced an initial of 50 bbls. Jones and Coyle are drilling No. 3 on the Margaret Brillhart farm, same section, and Donaldson and others are drilling on the Minor Koechler farm, Section 20, same Township. In Crawford Township, O'Neal and others are having a fishing job at 800 feet and Newcomer and others are still shut down on the Albert Reber farm, Section 1, Pitt Township, same county.

Lewis-Ennis Oil & Gas Co. is down to 2,225 feet on the E. H. Brown farm, along the line of Sections 20 and 21, Grand Prairie Township, Marion County.

CENTRAL OHIO

Central Ohio is the most active in development work in the Central West although but three completions were reported, all being in Stark County. In Plain Township, Ohio Fuel Gas Co. reported a gas well in No. 1-5,705 on the William F. Kuntz farm, Section 19. Same company made a location for No. 1-5,725 on the Mary E. Kuntze farm, in Section 18, same township. In Jackson Township, same county, Barnhart and others drilled in No. 1 on the J. Montgomery farm, Section 25, getting a gas well in the Clinton lime from 4,428-59 feet, and Kime and others' No. 4 on the Charles Oberlin farm, Section 6, same township, is a gas well in the Clinton from 4,159-77 feet. East Ohio Gas Co. has a rig in for No. 1 on the J. W. and C. Shook farm, Section 7, Jackson Township. East Ohio Gas Co. is drilling No. 1 on the Paul Belden farm, Section 18, Plains Township, same county.

White and others are drilling around 2,100 feet on the Sarah Lorenz farm, Section 17, Plain Township, Stark County. East Ohio Gas Co. is drilling around 3,000 feet at No. 1 on the Otto Frank farm, Section 20, same township. Same company is around 3,000 feet in No. 1 on the H. G. McDowell farm, Section 15, same township. Brendel Producing Co. is drilling around 3,200 feet in No. 1 on the J. S. Unger farm, Section 17, and about 2,000 feet at No. 1 on the M. M. Bivenour farm, Section 9, same township, and also drilling around 900 feet at No. 1 on the Minnie A. Sheets farm, Section 8, same township, while No. 1 on the I. and E. Markley farm, Section 9, Plain Township, Stark County, is drilling below 2,000 feet.

Stoltz and others are reported drilling below 2,800 feet on the Joe E. Beachy farm, Section 6, Berlin Township, Holmes County. Canton Drop Forge Co. is reported drilling around 1,200 feet on its fee property, Section 9, Canton Township, Stark County. Cunningham Natural Gas Co. is drilling around 3,000 feet on the Joe Herman farm, Section 17, Plain Township, and is around 800 feet on the F. and A. Willaman farm, same section and township.

C. L. and C. A. Williams made a location on the H. J. Still farm in Lot 2, Spencer Township, Medina County. East Ohio Gas Co. has a rig in for No. 2 on the John Wenhart farm, Section 20, Greene Township, Summitt County.

In Guernsey County, C. C. Wharton is drilling No. 2 on the H. H. and Mary Turner farm, Section 10, Westland Township. In Tuscarawas County, Lyons and Piefer have a rig in for No. 5 on the J. H. Weaver farm, Section 5, Fairfield Township. Hopewell Oil & Gas Co. is drilling on the G. H. Hursey farm, in Lot 22, Washington Township, same county. Frey and others have a rig up on the H. B. Gobert farm, Section 7, Fairfield Township, same county.

Wehrle Gas Co. is drilling on the Gail Baker farm, Section 1, Granville Township, Licking County. Ridgeway and others are drilling on the Bessie Hoyt farm, Section 17, Perry Township, same county.

Stoltz and others are reported at 2,800 feet on the Joe E. Meechy farm, Section 6, Berlin Township, Holmes County.

Kemrow Co. is reported drilling around 4,200 feet on the Orchard Acres farm, Section 19, Plain Township, Stark County.

KENTUCKY

In the Kentucky Field three tests were dry holes. In the Owensboro Field, Daviess County, Hupp, French & Co.'s No. 4, 1,150 feet from the south line and 150 feet from the east line of the Aca Bratcher farm, failed to find a commercial producer at 790 feet. It is in the Cane Run Pool.

Hupp, Duff and others drilled a dry hole in No. 5, 400 feet from the north line and 100 feet from the east line of the L. W. Ray 100 acres in the Haynesville Field, of Ohio County.

In Hancock County, Ray Baird and others' test, 200 feet from the east and west lines of the Brown School lot, in the Pellville Field, drilled in a dry hole.

MICHIGAN

Four completions were reported from the Michigan fields, the largest being Pure Oil Co.'s No. 2, 330 feet from the northwest lines of the P. O. Mates farm, SE SE Section 22, Porter Township, Midland County, which was drilled into the second pay sand in the Dundee formation where it is reported for an initial of 1,300 bbls. This well in the first pay sand produced an initial of 300 bbls. Pure Oil Co. also drilled its No. 3, 990 feet from the south line and 330 feet from the west lines of the P. O. Mates farm, NW SW SE, same section, estimated at 60 bbls. initial from the first pay sand and it will probably be sent to the heavier second pay sand.

Stork Oil Co.'s No. 1, 330 feet from the north line and 990 feet from the west line of the Jess B. Richmond farm, SW NW SE Section 22, Porter Town-

(Continued on Next Page)

New Ritchie County, West Virginia, Producer; Fourteen Wells Drilling in Southeast Ohio

By STAFF CORRESPONDENT

PITTSBURGH, Pa., May 22.—A second test in Clay district, Ritchie County, West Virginia, found production in the Injun sand. Frank Finley and others completed their well on the Boehm and Neeley lease, known as the Strickler heirs' farm, and have a producer estimated good for 25 bbls. a day initial.

The new well is about 1,500 feet northwest of the good producer on the Edgar Hinton farm, near Ellensboro. The Hinton well continues to flow about 50 bbls. a day, naturally, from the Injun sand and, since it was drilled in the latter part of February, has averaged considerably higher. The producing streak of Injun sand is considered to be narrow and directional, about east and west, with both ends turning north. This is evidenced by tests on either side of the producing streak which have been dusters or light gas wells.

Other wells are being pushed forward to completion in this district. On the Michael Moran farm, H. M. Dilley will probably complete his test within the week. Hinton Farm Oil Co. is down 1,600 feet in an offset to the discovery well and on the L. E. Robinson farm. Lucas and Mahaney are drilling at 1,500 feet on the Catherine Ball farm, the most westerly of any of the new wells drilling. Richards Farm Oil Co. has made 600 feet of hole on the Frank Ball farm. Egan and others have started drilling on the A. H. Adams farm. This is the most active drilling for oil since the curtailment began.

Completions in the Eastern fields continued few during the week. In Southeast Ohio no wells were completed. In West Virginia, in addition to the fair producer mentioned, one small producer, and one gas well were completed and one test was abandoned as a dry hole. In Southwest Pennsylvania there were no completions.

In spite of chaotic conditions and the resulting ruinous price structure of Pennsylvania Grade crude, refinery demand continues good and it is somewhat above the present production. The producer in the East, having a large number of small pumpers to maintain, is in a difficult position. With the exception of two small pools, drilling operations are continually declining in number with a consequent similar decline in production.

SOUTHEAST OHIO

No new wells were completed in Southeast Ohio during the week. About 14 wells are drilling. Interest is shown in the Benedum & Trees deep test on the E. E. Knowlton farm in Section 10, Independence Township, Washington County, in which the casing is being pulled back to the Ohio shale around 4,200 feet preparatory to a shot. Gas was found in this formation.

Two wells are starting in Coshocton County. In Clarke Township, Mehowa Oil & Gas Co. is testing the Sol Haun farm. In Perry Township, Section 17, Kundtz-Hulse, Inc., and others are preparing a second test on the H. L. McKee farm.

In Tuscarawas County, Hopewell Fuel Gas Co. is building a rig on the Edward Hursey farm in Section 22, Washington Township. In Berlin Township, Holmes County, a syndicate from Canton, Ohio, is drilling on the Miller farm in Berlin Township.

Steuben Oil Co. is drilling on the Carroll and Ebert lease in Richland Township, Belmont County. Both Richland and Union Townships have been the scene of fair wells in the past six months.

In Washington County, Swingle Brothers are about due in with No. 4 on the S. J. Weddle farm, in Section 28, Grandview Township. Herman Hill and others are drilling a second test on the Junius Greenwood farm, Section 8, Newport Township.

In Vinton County, Co-operative Oil Co. is about in with No. 3 on its own property, in Section 3, Knox Township.

WEST VIRGINIA

In addition to the fair producer mentioned, but two additional completions were made in West Virginia during the week. There was also one dry hole. One completion was a small producer. In Washington Township, Pleasants County, Dinsmore & Co. completed No. 5 on the A. J. Boley lease in the Cow Run sand. It will make about a 2-bbl. pumper.

In Roane County, on the waters of Laurel Run of Henrys Fork, D. S. Fisher and others completed a test on the Stella V. Knotts farm, in Spencer district. It is an Injun sand well, showing for a fair gas well in excess of 600,000 feet a day.

In Calhoun County, Norris and Cain drilled a test on the J. T. Miller farm in Washington district to 1,692 feet, the Injun sand, and abandoned it as a dry hole.

Drilling in West Virginia

In Gilmer County a new test has started. C. A. Jarvis and others have started drilling on the James H. Houghton heirs' farm in DeKalb district. A. E. Ellis and others have completed their rig for a test on the Webster and Ware farm in the same district.

In Calhoun County, three new tests are listed. In Sherman district, Creed Barker and others have a rig standing on the J. Lawson Kelly farm. In the same district, Poling and Mollahan is rigging up on the F. M. White farm, and Creed Barker has materials on the I. B. Fowler farm. In Center district, a new location has been made. Starcher

and Richards have staked out a test on the Chenowith and Edman lease. In Sherman district, C. B. Lewis and others are down 1,720 feet on the W. T. Kelley farm. F. F. McIntosh has reached 3,327 feet in a deep test on the Charles and John Davis farm in Lee district. In Sheridan district, Chemical Oil Co. is down 1,660 feet on the Margaret J. Webb farm. C. W. McCall & Co. are rigging up to drill deeper their No. 1 on the Hamilton, Jarvis and Garrett lease in Sherman district.

In Roane County, on Buffalo Creek in Curtis district, Reedy Oil & Gas Co. has spudded in a second test on the G. A. Knopp farm. In Spencer district, George Smith and others are down 650 feet in a second test on the C. A. Kendall farm on Buffington Run.

Four wells are drilling in Cabell County, C. C. Wolfe and others are down 2,266 feet in No. 5 on the Ben Lomond Land Co. tract in Guyandotte district, and on the T. H. Tanner farm they have shut down for a line at a depth of 770 feet. In this district, Gwinn Brothers and others are down 1,900 feet on their own property and Eureka Gas Co. has reached 1,150 feet on the Huntington Sand & Gravel Co. lot. In McComas district, Manufacturers Light & Heat Co. is rigging up on the W. H. Holton farm.

In Putnam County, on the waters of Laywell branch of Sycamore Creek in Curry district, United Fuel Gas Co. has completed a rig and is rigging up for No. 4,378 on the J. L. Ashworth farm. No additional hole has been made on the Cottle farm in Scott district by Teays Valley Oil & Gas Co. Casing is being run to a depth of 1,700 feet.

In Boone County, Pure Oil Co. is drilling three wells. In Crook district, it has a test drilling on the Pocatello C. & C. Co. property, at 2,158 feet. In Sherman district, its No. 61, on the Federal Coal Co. tract, is down 1,144 feet and on the LaFollette, Pritchard and Robinson Tract C, it has reached 1,264 feet. In Scott district, Cambridge Gas Co. is down 2,100 feet in No. 5 on the C. C. Lewis farm and in Washington district, Pond Fork Oil & Gas Co. has finished the 8¼-inch casing in No. 14 on the Cole and Crane lease.

In Wayne County, West Virginia Gas Co. is down 1,630 feet on the C. M. Watts farm, Union district. In Lincoln County, Kanawha Gas & Utilities Co. is drilling at 860 feet in a second test on the Nona Johnson farm, Sheridan district.

In Kanawha County, Marshall and Price are building a road to a location for No. 9 on the Goshorn and others' lease in Elk district.

SOUTHWEST PENNSYLVANIA

No completions and no additional drilling was noted in Southwest Pennsylvania during the week. In Amwell Township, Washington County, Hallam and Lewis are drilling in the Berea grit at a depth of 2,460 feet on the John Roach farm. The Fifth sand, or productive sand, is found at about 2,950 feet. Carnegie Natural Gas Co. has reached 1,500 feet on the Mrs. Meunzer farm. Raymond Orrill has started drilling his No. 3 on the Martha Hazlett farm.

Allegheny, Beaver and Greene Counties continue inactive.

Wildcats

In lower West Virginia, the test of Benedum & Trees on the Pocahontas Coal Co. tract in Big Creek district, McDowell County, is still drilling and has reached about 6,550 feet. It has been delayed with a fishing job.

In Virginia the only wildcat drilling is the Benedum & Trees' test on the I. Kaufman farm in Wise County. The depth is now about 2,950 feet. It was delayed during the week for a cable.

Central West Fields

(Continued from Preceding Page)

ship, is reported with an initial of 150 bbls. from the first pay in the Dundee formation. Goll-Graves-Meckling's No. 1, 990 feet from the south and east lines of the Joseph Otway farm, NW SE SW Section 22, is reported showing for a light oil producer and is being treated with acid.

Gordon Oil Co. and Edward Stewart's No. 1, 330 feet from the south line and 990 feet from the east line of the J. Richmond farm, SW SE NW Section 22, Porter Township, Midland County, filled up when at 46 feet in the Dundee formation last Wednesday, but did not make a flow and will be completed within a few days. This test is being closely watched on account of its closeness to the Teater-Otway lease on the north. It is on a 40-acre tract.

J. Mark Harvey, trustee, is drilling a test 330 feet from the south line and 990 feet from the west line of the Farmers State Bank farm, SE SW SE Section 8, Porter Township, Midland County.

Another well that will be due in a very short time is Gordon Oil Co.'s test, 990 feet from the north and west lines of the Muscott and others' farm, SE NW NE Section 17, Porter Township, Midland County. This is one of the most interesting tests nearing the Dundee in the Porter area. It is about 2 miles due west of Pure Oil Co.'s No. 1 on the State-Porter farm, and more than 2 miles northwest of the wells in Section 22.

C. Fred White's No. 1, 990 feet from the south line and 330 feet from the east line of the Joseph Otway farm, E half SE SW Section 22, Porter Township, Midland County, and a direct north offset to the discovery well of the field, No. 2 Otway is also in line for completion within a few days.

Talbot Oil Co.'s No. 7-"C," on the State of Michigan land, NE SW SW Section 11, Greendale Township, Midland County, is reported to be showing for a light producer.

New Pipe Line

Simrall Pipe Line Co., subsidiary of Roosevelt Oil Co., started construction of a 4-inch pipe line from the Greendale Township Field to Porter Township, the second line to be constructed into the new Porter district. The Simrall line will extend from Struble station in the Greendale Township Field southeast into the heart of the Porter Township development. It will be approximately 12 miles long. The Pure Pipe Line Co. was the first of the pipe line companies operating in the Central Michigan Field to extend a line into Porter Township. This company had previously constructed a line to the southern border of Greendale Township to handle production from the Yost lease. When development was started on a large scale in Porter Township the company put in a 6-inch line from the Yost lease to the Porter wells and replaced the tank farm Yost line with a 6-inch line. Whether other companies will build lines into the Porter area has not been definitely announced. Producers Pipe Line Co. is contemplating such action. If development continues on as large a basis as for the past month and production is increased, undoubtedly the leading pipe line companies will provide themselves with facilities in that district.

Drilling permits have been issued to C. W. Teater for No. 1, 330 feet from the north and east lines of the Joseph Wale farm, NE NE NW Section 22, Porter Township, Midland County, and to Fred W. Turner for a test 330 feet from the north line and 990 feet from the east line of the Clarence L. Baxter farm, NW NE NE Section 22, same township.

Lawson Gas Corp. is drilling in the southwest corner of the Arline and Arville Thayer farm, SW SW NW Section 23, Vernon Township, Isabella County.

Old Dutch Oil & Gas Co. is drilling 990 feet from the north line and 355 feet from the east line of the Frank Hallock farm, SE NE NW Section 6, Perry Township, Oceana County.

In Livingston County, H. Snell or Livingston Oil & Gas Co.'s test, 1,530 feet from the south line and 255 feet from the west line of the W. F. Zebb farm, NW SW Section 34, Genoa Township, caught fire, according to reports, from a light gas strike below 4,000 feet. New equipment is to be moved in.

The State of Michigan, it is reported, will hold an auction on 9,000 acres of state owned land on June 2, as a result of action taken by the lands division of the Conservation Department at Lansing, starting at 1:30 p.m., Eastern Standard Time.

Otis Denslow's test, in the southwest corner of the Herman Cook farm, S half NE Section 2, Broomfield Township, Isabella County, which ran into a fishing job at 350 feet, is to be skidded. The test is being made for gas and is 2 miles northeast of other producing gas wells.

Hints of Practical Value

By L. G. E. BIGNELL
Petroleum Engineering Editor

Liquid Measures and Conversion Factors

The following tables of liquid measures apply to water and they have been compiled from several reliable sources and are presented herewith because it is hoped that in this form they will be of use to engineers and others who deal with problems involving water.

Liquid Measure.
(Water, United States Standards)

4	gills	= 1 pint	= 16 liquid ounces	= 28.876 cu. in.
2	pints	= 1 quart	= 8 gills	= 57.75 cu. in.
4	quarts	= 1 gallon	= 32 gills = 8 pints	= 231.00 cu. in.
31½	gallons	= 1 barrel	= 7,276½ cu. in.	= 4.21 cu. ft.

A box, 19⅝ inches on each side contains 1 bbl.

Conversion Factors.

Cubic feet into gallons:

$$1 \text{ cu. ft.} = 1{,}728 \text{ cu. in.} = \frac{1{,}728}{231} = 7.4805194 \text{ gal.}$$

Gallons into cubic feet:

$$1 \text{ United States liquid gal.} = 231 \text{ cu. in.} = \frac{231}{1{,}728} = .133680555 \text{ cu. ft.}$$

Feet per second into miles per hour:

$$1 \text{ ft. per sec.} = 3{,}600 \text{ ft. per hr.} = \frac{3{,}600}{5{,}280} \text{ or } \frac{15}{22} \text{ miles per hour.}$$

Miles per hour into feet per second:

$$1 \text{ mile per hour} = 5{,}280 \text{ ft. per hr.} = \frac{5{,}280}{3{,}600} \text{ or } \frac{22}{15} \text{ ft. per sec.}$$

Second-feet per day into gallons:

1 sec.-ft., or 7.4805194 gal. per sec. for 1 day, or 86,400 sec. = 646,316.87616 gal.

Millions of gallons into second-feet per day:

$$1{,}000{,}000 \text{ gal. per 24 hrs.} = \frac{231{,}000{,}000}{1{,}728 \times 86{,}400} \text{ cu. ft. per sec. or } 1.5472286 \text{ sec.-ft.}$$

Second-feet per day into acre-feet:

$$1 \text{ sec.-ft. flow for 1 day} = 86{,}400 \text{ cu. ft.} = \frac{86{,}400}{43{,}560} \text{ or } 1.983471 \text{ acre-feet.}$$

Acre-feet into second-feet flow for 24 hours:

$$1 \text{ acre-foot each 24 hr.} = 43{,}560 \text{ cu. ft. each } 86{,}400 \text{ sec.} = \frac{43{,}560}{86{,}400} \text{ or } \frac{121}{240} \text{ sec.-ft. flow for 24 hr.}$$

Acre-foot into gallons:

$$1 \text{ acre-foot} = 43{,}560 \text{ cu. ft.} = \frac{43{,}560 \times 1{,}728}{231} \text{ or } 325{,}851.428 \text{ gal.}$$

Millions of gallons into acre-feet:

1,000,000 United States liquid gal. or 231,000,000 cu. in. = 133,680.555 cu. ft. or

$$\frac{133{,}680}{43{,}560} = 3.0688832 \text{ acre-feet.}$$

Second-feet into minute-gallons:

Factor: 1 cu. ft. contains 1,728 cu. in.; 1 gal. has a capacity of 231 cu. in.; 1 sec.-ft. = [(1,728 ÷ 231) × 60] gal. per min. or 448.831164 minute-gallons.

Minute-gallons into second-feet:

Factors: 1 gal. contains 231 cu. in.; 1 cu. ft. contains 1,728 cu in.; 1 gal. per min. = [(231 ÷ 1,728) ÷ ½0] second-feet, or .0022280092 second-foot.

U. S. gallons	8.33	= pounds
U. S. gallons	0.13368	= cubic feet
U. S. gallons	231.00	= cubic inches
U. S. gallons	0.83	= English gallons
English gallons (Imp.)	10.00	= pounds
English gallons (Imp.)	0.16	= cubic feet
English gallons (Imp.)	277.274	= cubic inches
English gallons (Imp.)	1.2	= U. S. gallons
Cu. ft. water (39.1°)	62.425	= pounds
Cu. ft. water (39.1°)	7.48	= U. S. gallons
Cu. ft. water (39.1°)	6.232	= English gallons
Pounds of water	0.01602	= cubic feet
Pounds of water	0.083	= U. S. gallons
Pounds of water	0.10	= English gallons (Imp.)

Eddy County Operators Anxious to Cut Output; Anthes Test Finds Water and Is Plugging Back

By TOLBERT R. INGRAM
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., May 22.—Operators in New Mexico are seeking a plan to shut in wells in Eddy County while crude prices are low and to curtail outlet of Hobbs Pool to not more than 5,000 bbls. per day. Three wells were completed at Hobbs, the most important being Texas Pacific Coal & Oil Co.'s No. 4-G State, on the northwest edge, which gauged 6,091 bbls. Acid used in the Leonard Barnsdall well in Eddy County failed to increase production. Test 25 miles west of Carlsbad is attracting attention.

The Anthes wildcat in northeastern Colorado found water in the Dakota and is plugging back to the Muddy which gives indications of making a producer. Other tests in that vicinity will be drilled. The Rangely Dome test of the California Co. is increasing oil flow and water is decreasing.

One small producer and one dry hole were completed in the Osage Field in Wyoming and two new locations were made. Mountain Fuel Supply Co. completed a small gas well in Baxter Basin in its No. 2 Mullen. Important changes in operation of Salt Creek properties are being negotiated.

In Montana, R. C. Tarrant's No. 1 Miller in the Cut Bank Field came in flowing and made 250 bbls. in less than 10 hours. There were no new locations. Ohio Oil Co. is preparing to test the Dakota in its only well drilling at Dry Creek.

NEW MEXICO

Operators in eastern Eddy County, including the Jackson and Maljamar Pools, plan to shut down their wells as a result of the low prices which were posted early in the month. Artesia crude is taking the 20-cent price, while eastern Eddy crude is posted at 15 cents, the pipe line differential amounting to 5 cents. Pressure is being brought to bear on Gov. Arthur Seligman to take similar action on behalf of the State as far as possible in the Hobbs Pool. He received a telegram from W. E. Lee of Tucson, Ariz., asking him to co-operate with Washington to bring about a complete shudown until "oil is at a fair price." Another telegram from operators in the Hobbs Pool said the royalty producers were hard hit by the depressed price and recommended that daily allowable be cut to not more than 5,000 bbls. until the price goes to 50 cents or more. Last January, when the proration agreement between the operators and the State was being negotiated, the governor wanted a minimum of 35,000 bbls. daily incorporated in the agreement and the operators sought a smaller allowable. They reached a compromise on 30,000 bbls. and runs have been close to that figure ever since. Prior to the agreement the daily outlet was 21,000 bbls. Allowable outlet for last half of May was unchanged at 28,825 bbls. daily.

Lea County

Drilling operations in the Hobbs Pool came to a standstill with the completion of three wells the past week. No new locations were reported and there are no wells drilling. How long this condition will continue is not known, but prospects for resumption of operations are not promising.

Stanolind Oil & Gas Co.'s No. 29 Byers, C SW NW Section 3-19-38, was completed at a total depth of 4,190 feet in lime. It topped the Terry at 4,018 feet and the pay at 4,040 feet. The 2½-inch tubing was run to 4,167 feet and it was given a potential of 1,296 bbls.

Same company's No. 8 State, C NW NE Section 9-19-38, was drilled to 4,185 feet and tubing was run to 4,162 feet. It topped the Terry at 4,060 feet and the pay at 4,100 feet and is rated at 1,102 bbls. per day.

Texas Pacific Coal & Oil Co.'s No. 4-G State, SW cor. NE Section 24-18-37, an outside well on the northwestern flank, was completed at 4,225 feet and the 2½-inch tubing was run to 4,200 feet. It topped the Terry at 4,088 feet. The official gauging gave it a potential of 6,091 bbls.

A new location was made in the Lea Pool in Cranfill & Reynolds' No. 4-B State, C Lot 10, NE Section 2-21-33. It is an offset on the northwest to its No. 3-B State, SW cor. Lot 9, Section 2, completed early in 1930 as a 1,200-bbl. pumper, and which went to water about a year later.

The Texas Company's No. 3-A Lynch, C NW NE Section 34-20-34, is drilling at 850 feet in red shale.

In the Jal area, The Texas Company's No. 1-B Shepard, NW cor. SW Section 5-26-37, was deepened to 3,262 feet and is running 2-inch tubing to test. It tested 252 bbls. first 24 hours and 278 bbls. the second period at 3,200 feet. The Continental Oil Co. and the California Co.'s No. 1-A Wells, SW NE NW Section 12-25-36, is drilling at 3,002 feet in sandy lime. It made 3,000,000 feet of gas per day at 2,880-87 feet. E. B. Guess' No. 1 Conditt, C SW SW Section 12-25-36, is waiting for rotary tools at 530 feet.

Eddy County

The first attempt in Eddy County to increase the production of a well by the use of acid was made in Harry Leonard and Barnsdall Oil Corp.'s No. 1 Dodd, SW SE SW Section 22-17-29, in the Jackson area. Total depth is 2,993 feet in lime. An oil blanket was built up into the hole to 2,900 feet and tubing run to 2,700 feet. Then 850 gallons of acid was run into the hole under pressure and allowed to remain for 30 hours. Gas lift was then applied and it made 18 bbls. the first 24 hours and 17½ bbls. the second period, resulting in almost no increase. This well gauged 6,742,000 feet of gas per day at 2,307 feet. The gas was saved. On a swabbing test at 2,729 feet the well made 17 bbls. in 24 hours.

Flynn, Welch & Yates' No. 64 State, SE NE NW Section 10-19-28, Artesia area, is drilling at 1,450 feet in lime.

Ralph Spearow and others' No. 1 McClellan, SW NW NE Section 22-22-23, Indian, 25 miles west of Carlsbad, is drilling at 2,060 feet in lime. This test is attracting considerable attention and Mr. Spearow has furnished the writer some information regarding the hole at a depth of 2,000 feet. At that depth he said the dimension of the hole is 10 inches with the 10-inch casing successfully seated at 1,442 feet. Since 980 feet the hole has been carried without interruption through black oil saturated limes. The limes are now more than 1,000 feet in thickness and are similar in character to the black limes encountered in the Ranger Field if Texas, where production by shooting in some wells reach as high as 7,000 bbls. per day. The principal difference between these black limes and those encountered in the Ranger Field, he says, are that the thickness of the limes in this test are twice the thickness encountered at Ranger and the gas saturation is markedly greater, and the limes themselves are considerably softer. The original objective of this well is the Pennsylvanian pay horizon which is expected at 3,500 to 3,800 feet. The well will not be shot until this objective is reached.

The syndicate which is drilling No. 1 McClellan is making preparation to drill a test on the Dark Canon structure 12 miles to the southeast, which it controls. They have 100,000 acres on the two structures.

De Baca County

Landowners Oil Co.'s No. 1 State, SW cor. NE Section 16-1s-27, Buffalo Creek, is preparing to resume at 5,860 feet. A. H. McAdoo, who has been in charge, has returned from a trip to the east.

Valencia County

Western Natural Resources Corp., Inc.'s No. 2 San Clemente grant, SW cor. NE Section 5-6n-1e, De Chaves district, is drilling at 4,475 feet in sandy shale with 3,000 feet of water in the hole.

COLORADO

Weld County

Hopes amounting almost to conviction that Continental Oil Co.'s No. 1 Anthes, C NE NE Section 24-8n-59, New Raymer district, joint with California Co. and Centennial Plains Co., would come in as a producer in the Dakota sand were upset this week when water was encountered in the objective. The first reaction among the oil men was pessimistic in the extreme as to the oil possibilities in northeastern Colorado, but it did not last long and already plans are being worked out for at least one more test in that immediate vicinity. The geologists are making a study of the logs of the various wells and searching for an explanation of the failure of the Anthes test. The evidence points strongly to the district being a faulted area and the necessity for drilling other tests before any final conclusions can be reached. Some of the companies questioned the location selected for the Anthes test as being the most desirable even before drilling started on the theory that it was in a faulted area and factors developed by the operation lend credence to this theory. The Muddy sand in the Anthes well, although higher than the same formation in Ramsey Petroleum Co.'s No. 1 St. Anthony, 5 miles south, showed oil saturation, while the Muddy in the Ramsey well showed only gas. The Ramsey well made 40 bbls. of oil the first 24 hours in the top of the Dakota and 20 bbls. the second period, but no such results were apparent in the No. 1 Anthes, although geologically it was 30 to 40 feet higher.

No. 1 Anthes apparently topped the Dakota at 6,623 feet. At first it was sandy shale. The formation gradually graded into sand with additional depth and at 6,627 feet the bit entered typical grayish white quartzite sand which was very hard. The water began showing in the core at 6,637 feet and drilling was stopped at 6,658 feet. There is some question as to what the sand showed just above 6,637 feet as gas appeared in the slush pits, while the 10-foot core at 6,627-37 feet was being taken, but did not show in the core. Preparations are being made to plug off the water in the Dakota, run pipe to the top of the Muddy and make a test. The Muddy was found at 6,623-38 feet and the cores showed gas in the top and oil saturation in the remainder. The formation was a much better sand than found in wells in Greasewood and was thicker, there being 15 feet of good sand. In fact, the showing is considered more favorable than in No. 1 Briggs in the Greasewood Pool, which made 441 bbls. the first 24 hours with 4,500,000 feet of gas. This well has been on production a year and a half and is still flowing 100 bbls. per day.

It probably will be several weeks before plans for additional drilling in that area are finally completed. A project is being worked out for another joint test to the west of No. 1 Anthes and it expected that W. R. Ramsey will go ahead with plans for another well in the vicinity of his gas well. The proposed well to the west of the Anthes in all likelihood will be a deep test which will go through the Dakota and into the Lakota. Several other wildcats in other areas which are in the negotiation stage are expected to materialize regardless of the outcome in the No. 1 Anthes.

Boulder County

Ed Rokhoff and others' No. 1 Blubaugh, SE cor. Section 20-3n-70, Lyons district, is shut down at 750 feet.

Fremont County

Dr. T. A. Davis' No. 7 Mojada, NE SW SE Section 21-20-69, South Florence, is shut down in black shale at 2,625 feet, and Cherry Creek Placer Co.'s No. 1 Lucas, SW cor. NE Section 32-18-69, is still waiting for casing at 1,325 feet.

Park County

South Park Oil Co.'s No. 1 Milligan, NE cor. SE Section 13-8s-76, Jefferson district, is drilling at 3,038 feet in sandy shale, and South Park Oil & Gas Co.'s No. 1 Esche, SE cor. NW Section 5-9s-76, Como district, is shut down at 2,467 feet.

Larimer County

C. Leonard Smith's No. 2 Union Pacific, SW cor. Section 31-12-69, Sand Creek, is bottomed at 615 feet and reaming preparatory to running the 6¼-inch.

Moffat County

Mountain Fuel Supply Co.'s No. 2 Florence Wilson, C NE NE Section 22-12-100, the Hiawatha Dome deep test, is waiting after cementing 20-inch at 108 feet, and its No. 1 Hatch, C NW SW Section 9-11-101, Sugarloaf, has rig up.

Rio Blanco County

California Co.'s No. 1 California-Raven, NW SE Section 30-2n-102, Rangely Dome, is testing at 6,315 feet. It is swabbing daylight only and is reported showing an increase in oil and a decrease in water. Last week it was averaging 100 bbls. of fluid, of which 80 per cent was oil. When unloaded at 6,228 feet last December for a test, it did not show any water. Since then it has built up water from the drilling fluid.

WYOMING

Reports from the Osage district in Weston County are that the refiners are running only a small per cent of their capacity as a result of the situation developing out of the attitude of officials

in adjoining states in collecting taxes on products sold for tractor fuel. There are intimations that developments may reach the courts.

General Oil Co.'s No. 1, NE NW SE Section 22-46-64, is estimated good for 15 bbls. per day from sand at 2,255-60 feet and it will be shot. Nothing was found below the sand to 2,300 feet where drilling stopped. Jones, Rose & Herbison's No. 3 Thierry, NW SW SE Section 31-46-63, was dry at 1,540 feet.

Two new locations are Rose & Herbison's No. 1, NW NE NE Section 13-46-64, and the Duluth-Wyoming Oil Co.'s No. 3, SE cor. SW Section 12-46-64.

Paymac Oil Corp.'s No. 1 Toyne, SE NW NE Section 3-46-64, is rigging to resume at 1,700 feet. The 5-7/8-inch will be run.

Albany County

S. Marvin James & Co.'s No. 1 Hindry, C SW SW Section 10-13-76, Riverside district, is drilling at 1,020 feet and has encountered additional shows of gas. Its objective is a sand in the top of the Casper formation.

Carbon County

Earl W. Reeder, Inc.'s No. 1 Union Pacific, C SW SW Section 19-20-83, Overland Dome, is drilling below 700 feet and carrying the 15½-inch. Ohio Oil Co.'s No. 2 Union Pacific, Section 35-20-88, Lake Valley structure, has been cleaned out and put on production from the Dakota at 3,750 feet. It is making 4,000,000 feet of gas per day. This well recently was acquired from the Hatfield Oil Co. with its block on that structure. Ohio Oil Co.'s No. 1 Hazlett, SW Section 34-23-79, Allen Lake, spudded and shut down to complete rigging.

Sweetwater County

Mountain Fuel Supply Co.'s No. 2 Mullen, SW NE SE Section 2-17-104, South Baxter Basin, was completed at 1,853 feet for 2,150,000 feet of gas per day and has been connected with the pipe line. Production comes from the Frontier at 1,720-1,853 feet.

Same company's No. 2 Cappers, SW cor. NW Section 12-19-104, North Baxter Basin, is cleaning out at 2,480 feet.

Fremont County

The Texas Company's No. 2 State-Ridgway, SE SW SW Section 36-34-95, Alkali Butte, is fishing for tools which were lost while trying to cut the 7-inch at 4,410 feet.

Natrona County

Mutual Oil Syndicate's No. 1 Boyer, SW NE NE Section 23-35-79, Midway Dome, cored the Shannon at 2,403-25 feet and found a show of gas. It will run a string of 4½-inch and test before going into the second bench of that sand which produced gas in other tests drilled on the structure. The top of the Shannon was 10 feet higher than in the discovery well.

The contract between Midwest Refining Co. (now Stanolind Oil & Gas Co.) with Mountain Producers Corp. and Salt Creek Producers Association subsidiaries for operating their Salt Creek properties expires January 1, 1934. Negotiations are pending for a new contract. Unless a new and satisfactory contract is made, the companies will take over and operate their properties. In either event, the cost of operations after this year will be borne by the companies owning the leases. Under the expiring contract, the Midwest bore this cost.

MONTANA

Glacier County

The Cut Bank Field furnished a surprise the past week when R. C. Tarrant's No. 1 Miller, C NE NE Section 24-34-6w, began flowing and made 250 bbls. in less than 10 hours. Another feature of the well was that it showed oil in the Stewart, on upper sand. The location is in proven territory and the importance of the showing is in the size of the well. It topped the Stewart sand at 2,737 feet and at 2,737-42 feet made 1,000,000 feet of gas per day. Oil was encountered at 2,742-75 feet in sand and this was followed by 2 feet of light blue shale at 2,773-75 feet. The bit then went into extremely hard sand at 2,775 feet, which continued to 2,785 feet. The sand then loosened up and was very coarse and black from 2,785-98 feet, total depth. At this depth it was still in the Darling sand. The well is one-fourth of a mile to the northwest of Santa Rita Oil & Gas Co.'s No. 2 Yunck, which made 48 bbls. initial. The last named topped the Darling sand at 2,811 feet and cut the Stewart at 2,773-75 feet. The Tarrant well is 1 mile southeast of Tarrant's No. 1 Haglund, which pumped 80 bbls. initial from sand at 2,848-94 feet. The elevation of No. 1 Miller is 3,795 feet.

There were no new locations reported. Alberta-Pacific Consolidated Oil Co.'s No. 1 Kiesel, NE cor. NW Section 11-34-6w, which swabbed 90 to 100 bbls. daily before the rig was destroyed by fire, cemented 6¼-inch at 2,796 feet and succeeded in pulling about 2,000 feet of the 8⅝-inch. Same company's No. 2 Matson, SE NE SW Section 14-34-6w, is drilling at 1,665 feet, and its No. 2 Kiesel, SE cor. NW Section 11-34-6w, is a rig.

Santa Rita Oil & Gas Co.'s No. 1 Blackfeet, C SW NE Section 15-35-6w, is ready to go on the pump. It averaged 95 bbls. per day on a swabbing test. Same company's No. 2 Blackfeet, SE NW Section 15-35-6w, spudded May 9 and is drilling at 565 feet, and its No. 1 Jacobson, joint with P. T. Sweeney, C NW NW Section 23-37-5w, ran the 6¼-inch to 2,490 feet. Last named is 15 miles to the north of the producers in the Cut Bank Field and is reported running high.

Dakota-Montana Oil Co.'s No. 1 Haglund, Sr., SW NW NE Section 14-34-6w, is drilling at 800 feet, and Santa Rita Oil & Gas Co.'s No. 1 Olson, NE cor. Section 26-34-6w, is drilling at 1,560 feet. Par Oil Co.'s No. 1 Haines, SE SE Section 2-34-6w, cemented off tools at 2,784 feet total depth, and drilled by with 4¾-inch bit. Hannah-Porter Co.'s No. 1 Britton, NW NE NE Section 23-34-6w, is drilling at 2,225 feet and W. M. Fulton and others' No. 1 Haggerty, NE cor. Section 16-34-6w, is waiting for a few hundred feet of additional 10-inch. R. C. Tarrant's No. 2 Haglund, Jr., C NW SE Section 13-34-6w, will spud this week.

Carbon County

Ohio Oil Co.'s No. 9 Souders, C NE SW Section 2-7s-21, Dry Creek, which cemented the 8⅝-inch on top of the Lakota at 5,471 feet and stopped to standardize, cemented back and is preparing to test the 10 feet of Dakota which showed saturation. Reserve Oil Co.'s No. 1 Crofts, SE cor. SW Section 34-6s-21, cemented 15½-inch at 512 feet.

Important Test in the Far South Turner Valley; Several Others Are in Prospect in Area

By VICTOR LAURISTON
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, May 20.—The drilling boom in the south end of the Turner Valley Field is expected to result this spring in an important wildcat test which may extend the producing area several miles. Tentative plans under consideration by interests closely connected with A. H. Mayland and Mercury Oils, Ltd., contemplate a test in the extreme south end, fully 4 miles south of Union Drilling Co.'s No. 1 wildcat in Section 21-18-2w5 and approximately 5 miles south of the nearest production.

Development in the south end has been encouraged by results secured in Mar-Jon-Freehold's No. 1 and adjacent wells, and by the action of the Alberta government in again permitting the drilling of new tests into the crude naphtha horizon of the deep lime.

The history of the Turner Valley Field has been one of a steady southward extension. The wells in Township 18 are large producers, Mar-Jon-Freehold's No. 1 rating 460 bbls. a day and Merland's No. 1 being somewhat better. To what extent intensive drilling in this area will reduce production is uncertain. There is also some uncertainty as to whether the producers on Township 18 are on the Turner Valley structure proper or on a parallel fold, some operators inclining to the latter view.

Extension of the proven production to the north of the original central field has not kept pace with the southern development. Some fairly good producers were drilled in the McDougall-Segur and Vulcan areas in Sections 12-20-3w5 and 13-20-3w5, but so far only two wells farther north have got production in the deep lime. A considerable number of tests were started at the height of the boom, but most of these were left unfinished owing to faulted conditions in the field or financial difficulties.

Mar-Jon Producer

Government tests of Mar-Jon-Freehold's No. 1, LSD 9, Section 28-18-2w5, are being completed, with a view to setting the gas quota for the well. Initial wet gas production was reported some weeks ago around 16,000,000 feet with a crude naphtha recovery over 460 bbls. a day. For the past six or seven weeks production has been taken at the rate of 330 bbls. a day.

Associated Royalties' No. 1 Spray, LSD 9, Section 5-19-2w5, is still at 3,350 feet, fishing and working on casing. At this depth it is close to possible light crude production in the McDougall-Segur sand.

New Tests for South

Among the prospective new tests for the south end, Pacalta Oils' No. 1, LSD 7, Section 28-18-2w5, is still moving equipment from the Warner lease on the Highwood structure, but is expected to spud early next month. Sunburst-Mid-Royal's No. 1, LSD 14, same section, is preparing to move drilling outfit from Mid-Royal's No. 1 in the central field. Robert Wilkinson and associates of the Sterling-Pacific Syndicate have done some preliminary work in connection with a test in Section 33-18-2w5, adjoining Sterling-Pacific Oil Co. producers.

A number of other new tests are in prospect for this section. Hoffar-Lundy Syndicate of Vancouver is reported planning a second well on acreage fairly close to its No. 1 in Section 22-18-2w5. Spooner Oil Co. which has some production in the central field is considering a test on acreage in the south, the drilling to be handled by Clarence Snyder.

Several tests offsetting Merland Oil Co.'s No. 1 producer in Section 27 are mooted. Vancouver syndicates are interested in two, one of which may be drilled on acreage of Director Oils, Ltd. A third Vancouver syndicate is reported arranging with the Merland company to drill a second well on the Merland lease. Okalta Oils, Ltd., which is now completing some of its unfinished wells in Section 1-20-3w5, is likely to drill a well in the southern area later.

J. H. McLeod, western production manager of Imperial Oil, Ltd., states his company has no plans for early drilling in the South Turner Valley area. Drilling operations in the past have been carried on through Royalite Oil Co. and other Imperial subsidiaries, as well as under special arrangements with various associated companies, the work being handled by the technical staff headed by Mr. McLeod. Over a year ago the Imperial interests completed their drilling program for the Turner Valley, and since then the company has been inactive. No new work is in contemplation.

Okalta Oils' No. 2 is preparing to pull casing and take crude oil production from the upper sands. The test failed to get satisfactory naphtha production in the lime, but the crude oil should run 50 bbls. a day. Following this, either Okalta's No. 4 or No. 5, also in Section 1-20-3w5 will be deepened to the same horizon.

Bow Oils' No. 1, LSD 14, Section 12-20-3w5, is reported preparing to resume work. It was formerly Illinois-Alberta Oils' No. 1, a deep lime producer.

Northern Alberta

In northern Alberta, Athadome Oils' No. 2, LSD 3, Section 15-66-23w4, is reported resuming after cementing casing just above the Athabaska sand at 2,150 feet. The test has already got a gas show reported 2,000,000 feet a day at 1,315 feet and shows of gas and asphaltic crude were reported below 1,700 feet. The Athabaska sand is the main potential horizon.

Twin River Test

On the Twin River structure southeast of Lethbridge, Nordon-Roney's No. 2 Twin River, LSD 11, Section 2-2-20w4, is reported drilling below 3,000 feet and making rapid headway.

Keho Lake Well

On the Keho Lake structure, Hudson's Bay Oil & Gas Co.'s No. 1 Keho, LSD 2, Section 17-11-22w4, which got a small production in a stray sand of the Benton shales around 3,770 feet, is being pumped twice a week, and is reported making around 5 bbls. a day. It is reported that some further geological work and structure testing will be done with a view to a second deep test.

Red Coulee Field

In the Alberta section of the international Red Coulee Field, Skov Oil Co.'s No. 1-A, LSD 2, Section 2-1-17w4, has been shot to loosen the lost tools.

On the Montana end, Monalta Oil Co., which pioneered this end of the field, has located a new test in SW Section 1-37n-4w, on the Buckley lease. This test is an east offset to Hannah-Porter Oil Co.'s No. 2 and a north offset to Alberta Pacific Consolidated's No. 1 Buckley. Drilling will be started this summer. The Monalta Oil Co., financed largely by Canadian interests, has two weeks on the Buckley lease which have been steady producers for the past three years.

Hunter Valley Test

In the forest reserve area west of Olds, Alberta, Hunter Valley Oil Co.'s No. 1, Township 31-10w5, is planning to spud in next month. Most of the material is now on the ground.

New Company Organized

Announcement is made that W. M. Fulton has organized a new corporation to handle his Cut Bank operations. The new company, known as Fulton-Commonwealth Oil Co., is capitalized at $100,000, the incorporators being W. M. and Olga M. Fulton and C. A. Nelson of Conrad and B. J. Bailey and R. P. Jackson of

Great Falls. Commonwealth Petroleums, Ltd. of Calgary, which has been active for some years in Alberta development, has a substantial interest in the new company.

Ontario Fields

In Essex County, Ontario, an important wildcat is being started by Bon Jasperson of Kingsville, in Lot 10, Concession 2, Maidstone Township, in the northern part of the county, and equipment is now being moved from the well further south and west in which Mr. Jasperson last year got small oil and gas shows in the Tilbury sand. The location is southeast of Puce and southwest of Belle River. The area has seen comparatively little drilling. About 1907 a test drilled by the Volcanic Oil & Gas Co. near Puce was carried to 1,400 feet and got a show in the Niagara formation; and a test drilled by Bert Bowlby for the Ainslie interests some distance southwest, near Woodslee, also got a show in the same horizon. If the venture gets commercial production, it will open a distinct new field, the previous Essex gas field having been a considerable distance south, along Lake Erie.

On the Harris farm, 2 miles west of Kingsville, Bon Jasperson has completed a small gasser around 960 feet. The test unofficially reported good for 500,000 feet a day, is making around 35,000 to 40,000 feet of gas, or less.

In the Tilbury Field, Kent County, Ralph Dawson's No. 4, Tackaberry farm, Lot 2, Concession 15, Tilbury East, is drilling below 1,375 feet with a small gas show, estimated 15,000 feet a day or less. It looks like a failure, but may be given a shot.

Revive Dutton Field

In Elgin County, Ontario, Harry Smith of Petrolia, formerly a driller in foreign fields, has bought the Dutton shallow pool in Dunwich Township south of Wallacetown. The field was developed more than 25 years ago by the Beaver Oil & Gas Co. Dave Barr of St. Thomas and other interests and includes some 180 old wells of which only a few have been on the pump recently. The production is similar to that of the Petrolia Field, though the area is much smaller. The new owner is planning to introduce a water pressure system to stimulate production.

Eastern Gas Fields

In the Haldimand area, there is considerable activity in the vicinity of Dunnville, where some 20 or 25 rigs are reported drilling for shallow gas. It is reported that around 35 new wells are completed every month, adding from 1,500,000 to 2,000,000 feet a day to the available gas production. Production is taken largely by the Southern Ontario Gas Co.

Continental Gas Corp. of Toronto, which holds over 1,000 acres in the Haldimand Field, has 13 producing wells, the production being taken by the Dominion Natural Gas Co. under a long-term contract. The company is reported planning to drill a series of 20 additional wells, to be financed out of earnings from its present production.

MEXICO CONTROLS RESERVES

A presidential decree providing for more oil reserves and stricter conservation laws is announced in Mexico City, giving the state economic control over the industry. In this way it is hoped an adequate supply of petroleum will be assured in case of emergency and the supply will be protected. The decree affects only lands not now under development or concession.

PETROLEUM ACCOUNTANTS

The Petroleum Accountants Society will hold its last meeting of the season, prior to the summer vacation, on Wednesday, May 24, at the Tulsa Country Club, at 6:30 p.m. As this is the final spring meeting the entertainment committee has an excellent program and it is desired that all members attend.

Wildcat Operations in Louisiana-Arkansas

(Continued from Page 68)

RAPIDES PARISH

Byers & Collingsworth's (was A. G. Beck et al's) No. 1 Hickman-Simmons Lbr. Co., 330 ft. S, 330 ft E, NW cor. Sec. 40-4-1e ..... Drlg. 1,480 ft.

RED RIVER PARISH

Edward & Clay's No. 1 Delta Pecan Co., 1,000 ft. N, 460 ft. E, SW cor. Sec. 27-13-11 ..... Arranging cmt. 6⅝-in. 2,458 ft.

SABINE PARISH

R. T. Henderson's No. 1 Bistrunk, 450 ft. N, 150 ft. W, C, Sec. 9-9-13 ..... Showed oil; bailed dry 2,079 ft.; S.D.

C. D. Lee, tr.'s No. 1 Whitney, 330 ft. N and W, SE cor. NW NE Sec. 19-9-14 ..... Base chalk 2,197 ft; S.D.; W.O. 2,295 ft.

CONVERSE DISTRICT

Lambert et al's No. 1 Edwards, 300 ft. S and E, NW cor. SW NW Sec. 29-9-13 ..... Drlg. 2,070 ft.

H. C. Lessenger's No. 1 Bowman-Hicks, 330 ft. S, 330 ft. E, NW cor. Sec. 13-9-13 ..... Bailed dry 2,031 ft; W.O.

Arkansas

COLUMBIA COUNTY

C. W. Alworth et al's No. 1 W. D. King, SW cor. SE SW Sec. 16-17-20 ..... Derrick.

DESHA COUNTY

T. J. O'Hara's No. 1 Martin, NW cor. NW SE Sec. 3-8-1e ..... Began drlg. May 8; S.D. acct. of high wtr. and waiting for csg.; T.D. 140 ft.

LITTLE RIVER COUNTY

American Portland Cement Co.'s No. 1 fee, 150 ft. S and E, NW cor. SW NE Sec. 21-12-32 ..... Coring anhydrite 2,360 ft.

MILLER COUNTY

J. T. Humphrey's No. 1 Grace, C SW SW Sec. 9-15-27... Cmtd. 10-in. 206 ft.

Mississippi

LAMAR COUNTY

Lamar Oil Co.'s No. 1 Scott, NE NE Sec. 13-2n-14..... Rigged up.

East Texas

CASS COUNTY

T. H. Pardoe, operator's No. 1 S. A. Orr, in the G. W. Morris Sur., 300 ft. east of the W line of the G. W. Morris Sur., also the east line of the David Frazier Sur. ..... S.D. fuel, 2,160 ft.

Wildcat Operations in Southwest Texas

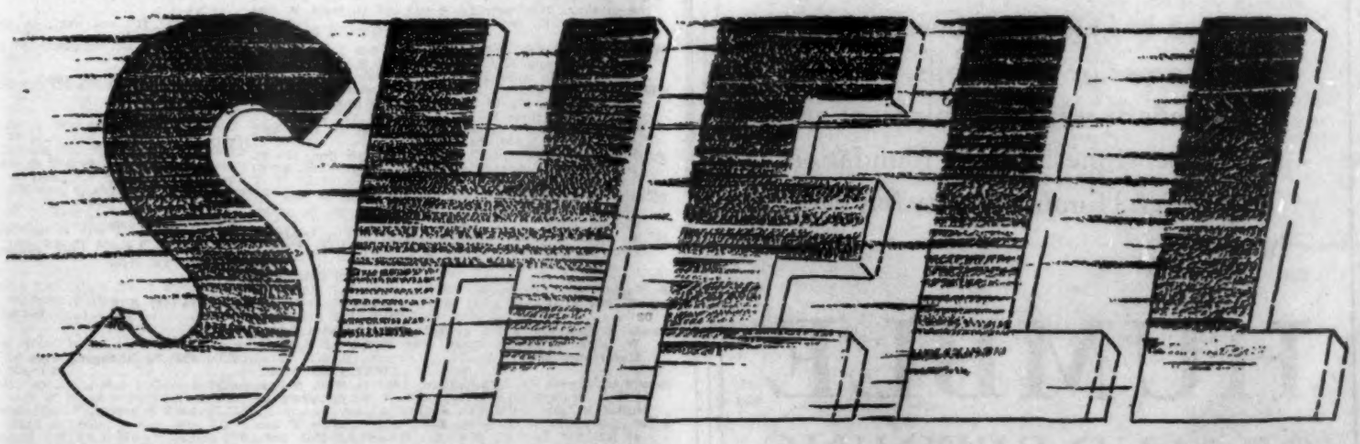
(Continued from Page 69)

William B. Stewart's No. 3 Duval County Ranch Co., 300 ft. from E line, 330 ft. from W line of S half of SE, Sur. 363 ..... Spudded in.

Whisenant & Trenchard's No. 1 Duval County Land Co., 1,750 ft. from N line, 1,100 ft. from E line of Sur. No. 76 ..... T.D. 750 ft; S.D. for wtr.

Whisenant & Trenchard's No. 2 Duval County Ranch Co., 300 ft. from N and W lines of E ½ of SE ¼ of Sur. 76 ..... T.D. 1,585 ft.; drlg.

Windsor Oil Co.'s No. 1 Peters, 330 ft. from E line, 2,904 ft. from S line of W ½ of S (or 1,600 ft. to N 2,900 ft. to W of Sur.) No. 33..... Rigging up.



The Utmost Delicacy
of
REGULATION

GF

A HIGH and variable inlet pressure can be reduced to a low and unvarying outlet pressure by the specially designed and precisely made Fulton Duplex Sensitive Gas Governor. A mixture of natural and manufactured gas can be controlled with extreme accuracy and with perfect assurance. Frictional surfaces reduced to a minimum, diaphragm area extraordinarily enlarged, and non-corroding materials scientifically adapted to their use, account largely for the success of this dependable Governor. Extremely simple. Easily and quickly installed. No accessories to give trouble. Ask for full description.

The Chaplin-Fulton Manufacturing Company
28-40 Penn Avenue **Pittsburgh, Pa.**

REPRESENTATIVES:

WESTCOTT & GREIS, Inc., *Sales and Service* Dallas—Tulsa
C. H. COLLINS 628 Dwight Bldg. Kansas City, Mo.
HIMELBLAU, AGAZIM & CO., 228 N. LaSalle St. Chicago, Ill.
Or Any Jobber

Fulton Duplex Sensitive Gas Governor

CONSTANT

research in field and laboratory, the use of superior crude oils, and the most modern refining equipment are the three stones in the foundation upon which Humble quality has been built.

HUMBLE
OIL AND REFINING COMPANY
HOUSTON, TEXAS

Producers, Transporters, Refiners and Marketers of Petroleum and Its Products.

Wright & Wilson's No. 1 Wood-Welder, 4,150 ft. from N line, 7,200 ft. from W line of Sur. No. 102 ..... T.D. 150 ft; drlg.

FRIO COUNTY

James E. Greenlee's No. 1 W. W. Burns, 613 vrs. to N line, 900 vrs. to W line of Antone Hutzler Sur. ..... T.D. 2,330 ft; set csg; waiting on cement.

GONZALES COUNTY

Weimer Dev. Co.'s No. 1 T. H. Brandt, Sur. 5 miles NE from Weimer ..... Making location.

GUADALUPE COUNTY

Buckley Bros.' No. 1 M. T. Howell, 2,800 ft. S of road, 187 ft. from E line of tract in Jacob Darst Sur. .... Moving in tools.

HIDALGO COUNTY

Carl & Johnston's No. 1 Doughty, 187 ft. from S and E lines of Lot 11, Blk. 6 of Subd. of Indios Ranch Sur. in N. Hidalgo ..... T.D. 2,300 ft.; drlg.

Maxwell & Young's No. 1 King, 175 ft. from N and E lines of Lot 3, Blk. 16, Alamo tract ..... Spudded in.

JIM HOGG COUNTY

D. C. DeWitt's No. 1 A. G. Lopez, 3,475 ft. from W line, 425 ft. from N line of Sur. No. 106 ..... T.D. 1,650 ft.; drlg.

R. F. Forse's No. 1 Holbien, 150 ft. from N and W lines of Blk. 54, Sec. 9 of Holbien Sur. of Share 3 of Las Animas grant ..... T.D. 2,590 ft.; drlg.

Seaton A. Barnes, Jr.'s No. 1 R. Holbien, 230 ft. from W line, 340 ft. from S line, of Blk. 54, share 3, Los Animas tract ..... T.D. 120 ft.; drlg.

KERR COUNTY

J. E. Anderson's No. 1 J. D. Witt, 1,320 ft. from N line, 1,320 ft. from W line of Sec. 1,923, in Hamilton Sur., 4 miles S of Center Point ..... T.D. 1,908 ft; lowering 12½-in. csg.

Eastland Oil Co.'s No. 1 Love, 1,100 ft. SW of Evans & Gant's No. 1 Love ..... T.D. 250 ft.; drlg. crevice in Edwards.

KLEBERG COUNTY

Harry Clark's No. 1 V. J. Kivlin, 360 ft. from E line, 400 ft. from S line of Sec. 39, Blk. 8, Kleberg Town & Improvement Co. Sur. ..... T.D. 1,800 ft; drlg.

Harris et al's No. 1 Dennett, 660 ft. from S line, 760 ft. from E line of Blk. 7, Sec. 38, Kleberg Town & Improvement Co. Sur. ..... T.D. 2,797 ft; resumed drlg.

LEE COUNTY

Paton Bros.' No. 1-B Turner, 424 ft. from NW line, 375 ft. from NE line of 51.9-ac. tract in David Hudson Sur. ..... T.D. 6,009 ft.; S.D. in chalk; contract called for 6,000 ft. or Edwards.

LIVE OAK COUNTY

Jacob, Buzzini & Pickett's No. 1 J. W. Griffith, 150 ft. N of road and on the McMullen-Live Oak County line, T. Sparks Sur. No. 16 ..... T.D. 915 ft.; drilled plugs.

Cohagen et al's No. 1 Nichols, Sur. 3 miles S from Fant City ..... Moving in tools.

McMULLEN COUNTY

Jacob, Buzzini & Pickett's No. 1 Hurt & Tartt, 160 ft. from SW and SE line of J. W. Williams Sur. 144 .... T.D. 1,050 ft; coring.

C. W. Gillette's No. 1 J. Dickinson 100 acres, 740 ft. from NW line, 750 ft. from NE line in Blk. B-29, A. Barrera Sur., 5 miles W from Whitsett ..... T.D. 694 ft.; waiting on csg.; shows oil saturation.

C. B. Loftin's No. 3 R. H. Brown, 5,383 ft. from N line, 924 ft. from E line of 3,906-ac. tract in Sur. No. 64 ..... T.D. 763 ft; swabbing a little oil.

C. R. Pope, Inc.'s No. 1 A. C. Miles, 200 ft. to E line, 2,375 ft. to S line, Sur. 149 ..... T.D. 1,791 ft.; drlg.

S. R. C. and Sinclair Prairie's No. 2 LaChusa, 330 ft. from S and E lines of NW Sec. 36, Sur., 2 miles E from No. 1 ..... T.D. 350 ft.; drlg.

S. R. C. and Sinclair Prairie's No. 2 LaChusa, 330 ft. from S and E lines of NW of Sec. 36, 2 miles E from No. 1 ..... T.D. 350 ft.; drlg.

Shumway et al's No. 2 Shiner, Sur. 2 miles NE from No. 2 Shiner ..... Rigging up.

Tarver & Nance Co.'s No. 2 Dickson Farm Mrtg. Co., 700 ft. due W of No. 1, 900 ft. from NE line, 300 ft. from SE line of survey, Sec. 45 ..... T.D. 682 ft.; changing rigs.

NUECES COUNTY

John F. Camp's No. 1 King, 150 ft. from N and W lines of E½ Sec 29 of Richard King Subd. Sur. ..... Derrick; waiting for rig.

SAN PATRICIO COUNTY

George W. Scruggs' No. 1 Collins, 1,040 ft. from NE line, 700 ft. from SE line of Blk. 36, E. J. McGloin Sur. ..... T.D. 2,756 ft; changing to heavier rig.

STARR COUNTY

B.&B. Oil Co.'s No. 1 Crown Brick & Tile Co., 1,800 ft. S of State Highway No. 4 and 580 ft. from W line of Porcion 87, near La Puerta ..... T.D. 4,532 ft.; set csg.; to drill in next week.

W. P. Chancellor's (Bryan & Tharp) No. 1 A. Guerra, 26,000 ft. from line, 2,600 ft. from E line of Share No. 6 of San Jose grant, in NE cor. of county ..... T.D. 1,345 ft.; temp. abnd.

Chiquita Oil Co.'s No. 1 Starr County Cattle Co., 341 ft. from W line, 371 ft. from S line of Share 60, Partition of Porciona 58 and 59 ..... T.D. 618 ft; drlg.

F. R. Cooper's No. 1 J. M. Martinez, 150 ft. to S and E lines of A.B.&M. Sur. No. 135 ..... T.D. 2,110 ft; drlg.

F. Davenport's No. 2 fee, 660 ft. from SE line, 250 ft. from SW line, Sur. 33 of C. O. Newman Subd. of El Benadito grant ..... T.D. 500 ft.; drlg.

Dawson et al's No. 5 Margo, 1,000 ft. from W line, 5,500 ft. from S line of Share 2-B, Por. No. 70, jurisdiction Mier ..... T.D. 500 ft; drlg.

E. H. Stickney's No. 1 H. Gonzales, 300 ft. from E line, 3,166 ft. from S line of H.E.&W.T. Sur. 339.... T.D. 745 ft.; drlg.; prev. reported depth an error.

TRAVIS COUNTY

F. Fuch's No. 1 Rummell, 300 ft. to S line, 150 ft. to E line of 163-ac. tract in Peter Cartwright Sur. ... T.D. 65 ft; S.D.

UVALDE COUNTY

Evans & Thompson's No. 1 Farris, 400 ft. from S and W lines of 535-ac. tract near center of John J. Hammond Sur. ..... T.D. 300 ft; changing rigs.

WEBB COUNTY

Edwin M. Jones' No. 1 Callaghan, 1,650 ft. from E line, 990 ft. from S line of Sec. 603 of B.S.&F. Sur., 13 miles E from Callaghan Switch ..... T.D. 2,860 ft.; drlg.

J. W. Edwards' No. 1 Volpe Bros., 150 ft. from E line of NE SW Sec. 17, Blk. 2, C.C.S.D.&R.G.N.G. Sur., 30 miles SE from Cactus ..... Rigging up.

Gibson et al's No. 1 Smith, 150 ft. from NE line, 300 ft. from NW line of Blk. 5, Sur. No. 1,103 ..... T.D. 1,626 ft.; drlg.

Will Ohlhausen's No. 1 Moses Jones, 275 varas from E line, 516 varas from S line of 100-ac. tract in Sur. No. 1,640 ..... Spudded in.

Seagraves & Salsbury's No. 2 Gates, 330 ft. from N and E lines of SE Sec. 64, Blk. 1 of C.C.S.D.&R.G.N.G. Sur. ..... Rigging up.

Shankle & Roche's No. 1 W. W. Stell, 660 ft. from N and W lines of NW NW of No. 37 Sur., 11 miles N from Mirando City ..... T.D. 1,450 ft.; drlg.

WILSON COUNTY

Sexton Pet. Co.'s No. 1 Joe Gutsell (1,033-ac.), 150 ft. from W line, 150 ft. from S line of road of F. Flores No. 13 Sur. ..... T.D. 175 ft; drlg.

ZAPATA COUNTY

Hamilton, Brower & Crow's No. 1 Slator, 2,111 ft. from SW line, 1,980 ft. from SE line of Blk. 1, Subd. of Slator ranch in J. V. Borrego grant ..... T.D. 1,250 ft.; drlg.

O. W. Killam's No. 5 Brunl, 150 ft. from SW and SE lines of Blk. 53, Killam Subd. of Borrego grant .... T.D. 1,642 ft.; comp. 30,000,000 ft. of gas.

Stevens & Brown's No. 1 J. M. Garcia, 150 ft. from NE line, 260 ft. from SE line of Blk. 103, Sur. 434.... T.D. 1,510 ft.; abnd.

Sarah Poppas' No. 1 Juan V. Cuellar, Jr., 150 ft. from NE and SE lines of Blk. 3, Sur. 2 of Poppas Subd. of Por. 34 ..... T.D. 200 ft.; drlg.

A. C. Savey et al's No. 1 Flores, 150 ft. from NW line, 300 ft. from NE line of Blk. 5, Share 1 of F. A. Richer Subd. of Porcion No. 38 ..... T.D. 2,110 ft.; drlg.

Stevens & Brown's No. 1 Alexandro Garcia, 660 ft. from SW line, 660 ft. from NW line of Blk. 6, Stevens & Brown Subd. of W 700 acres, Charco Redondo grant, A. Garcia tr. 16 miles SE of Zapata ..... Rigging up.

A. H. Wray's No. 1 Gopher Trust Est., in Fullerton Subd. of Share 8 of J. V. Borrego grant ..... T.D. 370 ft.; blew out while changing bits.

ZAVALA COUNTY

Zavala O. & G. Co.'s No. 1 Gates, 1,320 ft. from N line, 1,320 ft. from E line of Hooper & Wade Sur. No. 13.. T.D. 5,508 ft; waiting for wtr.

Southwest Texas Proven Areas

Week Ending May 13

HILBIG POOL—BASTROP COUNTY

Company, well, farm name, section and block— Remarks

Humble O. & R. Co.'s No. 2 Friske, 245 ft. from E line, 444 ft. from N line of lease, S. Wolfensbarger Sur... T.D. 2,600 ft.; drlg. Serpentine.

RIDDLE POOL—BASTROP COUNTY

Witherspoon Oil Co.'s No. 1 A. D. Harris, 1,050 ft. from NW line, 2,350 ft. from SW line of John Maxmillan Sur. ..... T.D. 2,309 ft; setting csg.

TULETA POOL—BEE COUNTY

Grisham et al's No. 1 Rapp & Hatch, 1,700 ft. from N line, 2,640 ft. from E line, Sec. 12 of Ragsley's Subd. of Uranga grant ..... Spudded in.

NORTH GOVERNMENT WELLS POOL—DUVAL COUNTY

George Parr's No. 1 Hahl, 330 ft. from N and W lines of SE of Sur. No. 46 ..... T.D. 2,398 ft.; abnd.; salt water.

Hester Bros.' No. 1 Lee, 330 ft. from S and E lines of NE of Sur. No. 47 ..... Rigging up.

Navarro Oil Co.'s No. 6 Hahl, 330 ft. from W line, 990 ft. from S line of Sur. No. 360 ..... T.D. 2,304 ft.; comp. 20 bbls. hrly.

Navarro Oil Co.'s No. 7 Hahl, 660 ft. from N of No. 6, 330 ft. from W line of Sur. No. 360 ..... T.D. 1,625 ft.; drlg.

Southwest Drlg. Co.'s No. 9 Wendt, 990 ft. from S and E lines of SE of Sur. No. 43 ..... Rigged up; waiting for wtr.

Sun Oil Co.'s No. 2 Weiderkehr, 1,650 ft. from S line, 330 ft. from E line of Sur. No. 359 ..... Rigging up.

The Texas Co.'s No. 6 Wendt, 350 ft. from S line, 990 ft. from E line of N ½ of NW ¼ of Sur. 42 ..... T.D. 1,620 ft.; drlg.

PETERS POOL—DUVAL COUNTY

Shasta Oil Co.'s No. 3 Peters, 330 ft. from N and W lines of S of W 200 acres of S½ of Sur. No. 175.. T.D. 2,252 ft.; abnd.

SARNOSA POOL—DUVAL COUNTY

Magnolia Pet. Co.'s No. 3 M. Ruiz, 300 ft. from NW and NE lines of S ½ of Sur. 576 ..... T.D. 2,466 ft.; comp. 100 bbls. dly.

Sarnosa Oil Corp.'s No. 7 Weil, 590 ft. SE of No. 6....Derrick.

Sun Oil Co.'s No. 3 Cano, 330 ft. from NE and SE lines of Sur. No. 576 ..... Derrick.

JACOB POOL—McMULLEN COUNTY

Longhorn Oil Co.'s No. 2-A C. T. Lark, in E. W. B. Scrugham Sur. ..... T.D. 1,020 ft; recmtng. csg.

SAXET FIELD—NUECES COUNTY

C.N.T. Co.'s No. 1 L. M. Vance, 330 ft. from E line, 1,320 ft. from S line of 255-ac. tract in Sur. 402.. T.D. 4,510 ft.; coring.

Gibson Oil Corp.'s No. 2 Rand Morgan, 1,320 ft. from N line, 330 ft. from E line of lease ..... T.D. 5,180 ft; S.D.

Houston Oil Co.'s No. 1 McGregor ..... T.D. 4,869 ft.; waiting on csg.; sand 4,852-69 ft.; coring ahead.

Gulf Port Oil Co.'s No. 3 Frank Bliss, 1,699 ft. to N line, 350 ft. to E line of 235-ac. tract in J. W. Stevens Sur. No. 406 ..... T.D. 5,616 ft; drlg.

Gulf Port Oil Co.'s No. 3 Humphreys, 115 ft. from N line, 330 ft. from W line of lease (8 offset to No. 1 Gibson, Rand Morgan Sur.) ..... T.D. 4,223 ft.; sand 4,217-23 ft.; tested salt water.

Gulf Port Oil Co.'s No. 1 Rand Morgan, 330 ft. from N and E lines of 80-ac. lease ..... T.D. 4,905 ft.; S.D. for repairs.

Holliday et al's No. 2 Smith 660 ft. N of No. 1 ..... T.D. 4,869 ft.; showed salt water; pulling tubing.

Sinclair Prairie's No. 1 Issences, 330 ft. from N and W lines of 80-ac. tract in Sur. No. 404 ..... T.D. 4,899 ft.; setting csg.; W.O.C.; tested gas and salt water 1,900 pounds.

MATHIS POOL—SAN PATRICIO COUNTY

Geo. W. Scruggs' No. 1 Collins ..... T.D. 2,756 ft.; changed to heavier rig.

WHITE POINT FIELD—SAN PATRICIO COUNTY

Saxet Oil Co.'s No. 19 Rachel ..... T.D. 7,405 ft.; perforated csg. at 4,860-70 ft.

LOS OLMOS POOL—STARR COUNTY

Hooks & Weaver's No. 15 Kelsey Bass, 200 ft. from W line, 150 ft. from S line, NW SE Sec. 6, Pors. 75, 76, 77, jurisdiction Camargo ..... T.D. 1,500 ft.; drlg.

Hooks & Weavers' No. 14-A2 Kelsey Bass, 200 ft. from W line, 350 ft. from S line of E 20 acres of NE SW Sec. 4, Pors. 75, 76, 77, Camargo ..... Drlg. 1,365 ft; moving in larger rig.

RIO GRANDE CITY POOL—STARR COUNTY

McKinley et al's No. 1 F. Yzaguirre, 150 ft. from E line, 920 ft. from N line, Blk. 3, Share 36-A, Porcion 80, Jurisdiction of Camargo ..... Rigging up.

AVIATOR POOL—WEBB COUNTY

Nueces Dev. Co.'s No. 1 Puig, 150 ft. from W line, 260 ft. from N line of Blk. 12, Edington Subd., Albercas grant ..... T.D. 2,385 ft.; drlg.

LAUREL POOL—WEBB COUNTY

Cole, Wise & Laurel's No. 3 Garcia-Villareal, 450 ft. from N line, 150 ft. from E line of Blk. 7, Sur. No. 1,100 ..... Rigging up.

O. W. Killam's No. 2 Garcia-Villareal, 150 ft. from N and W lines of NE SE of Sur. No. 1,100 ..... T.D. 2,392 ft.; abnd.

Montex Oil Co.'s No. 1 Laurel, 150 ft. from S and E lines of Blk. 4, Sur. No. 270 ..... Derrick.

Reward Oil Co.'s No. 1 Garcia-Villareal, 150 ft. from N and W lines of Blk. 6, Sur. No. 1,100 ..... Rigging up.

Shankle & Newton's No. 1 S. Benavides, 330 ft. from S and E lines of Blk. 13, in No. 2,272 Sur. ..... T.D. 40 ft; set surface csg.; W.O.C.

South Texas Oil Co.'s No. 16 Laurel, 150 ft. from S and E lines of Blk. 11, Sur. 271 ..... T.D. 2,288 ft; swabbing.

Texas Unity Oil Co.'s No. 1 Yeager, Sur. No. 51 ..... T.D. 200 ft; drlg.

Wise & Jackson's No. 2 Garcia & Villareal, 150 ft. from N and E lines of Blk. 7, Sur. No. 1,100 ..... T.D. 2,213 ft.; comp. 100 bbls. dly.

MOCA POOL—WEBB COUNTY

Moca Oil Co.'s No. 4 Duval County Ranch Co., 810 ft. from N line, 120 ft. from W line of Blk. 33, Share 3, Zapata County School Land ..... T.D. 1,214 ft.; P.B. to 891 ft.

Will Ohlhausen's No. 1 Moses Jones, 273 varas from E line, 516 varas from S line of 100-ac. tract in Sur. No. 1,640 ..... T.D. 823 ft.; drlg.

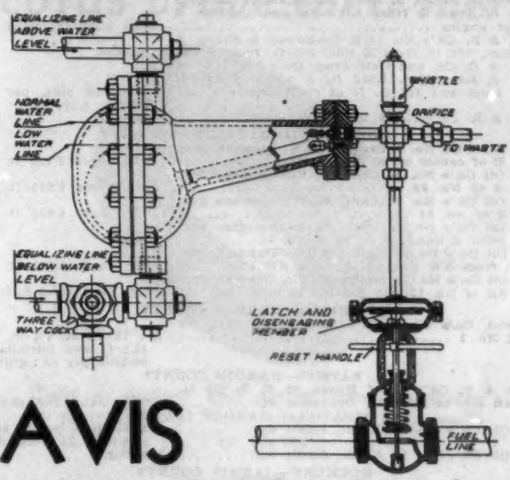
ESCOBAS POOL—ZAPATA COUNTY

Lafevre et al's No. 1 M. Garza Hrs., 330 ft. from NW and SW lines of Blk. 83, C. A. Douglas Subd., Zarro ranch, Comitas Grant Sur. ..... T.D. 1,800 ft; drlg.

Boiler Insurance Demands It!

INSURANCE companies believe in safeguarding their risks as completely as possible. Before you can get insurance on your gas fired field boilers they must be protected against the damage that might result from low water level. Compared with the resulting loss from a boiler explosion, the cost for necessary protective equipment is negligible.

The Davis Automatic *Low Water Fuel Cutout* is an APPROVED safety appliance. It functions when the water level becomes dangerously low and stops further generation of steam by closing the fuel line valve. In such emergencies, no fuel can flow to the burners until conditions have been righted and the valve reset. *Let us send details on equipment for your particular conditions.*



DAVIS

Automatic *Low Water Fuel Cutout* for Gas Fired Field Boilers

DAVIS REGULATOR COMPANY

2543 S. Washtenaw Ave., Chicago, Ill.

Westcott & Greis, Inc., *Sales Engineers*, Tulsa—Los Angeles—Dallas

OGJ 5-25 Gray

FOR SALE

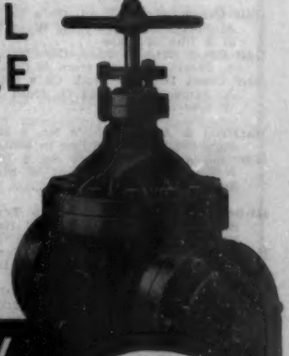
COMPLETE ABSORPTION TYPE GASOLINE PLANT

2—Worthington Vac. Comp. 18"x16" Belt Driven
2—Worthington Vac. Comp. 11"x12" Belt Driven
2—100 H.P. Motors, 440V. 860 r.p.m. 3 phase 60 cyc.
2—60 H.P. Motors, 440V. 860 r.p.m. 3 phase 60 cyc.
3—Dayton Dowd Cent. Pump Units—15 H.P. Motors
5—7'x30' Riveted Steel Storage Tanks
2—45 H.P. Horizontal Fire Tube Boilers
1—Twin Absorber Tank—Foster Baffles

All other equipment necessary for complete operation. This plant operated continuously and satisfactorily until closed about one year ago due to exhaustion of gas field. Plant located within a quarter mile of railroad siding, and within a half mile of Tulsa, Oklahoma, city limits.

OKLAHOMA POWER AND WATER CO.
SAND SPRINGS, OKLAHOMA

DESIGNED FOR OIL AND GAS SERVICE



Ludlow 1600-lb. test Double Gate Valves have thousands of boosters throughout the Petroleum Industry. All standard sizes up to 12 inches in all-iron or bronze-mounted types—of Ludlow guaranteed quality—guaranteed test—guaranteed construction.

The LUDLOW VALVE MFG. COMPANY
TROY . . . . NEW YORK

TRADE LUDLOW MARK

The Texas Company's No. 27 Measles, 915 ft. from SE line, 16,990 ft. from SW line of survey, Carrito Blanco grant ..... Rigging up.

MIRANDO VALLEY POOL—ZAPATA COUNTY

J. W. Edwards' No. 1 R. Hinnant, 150 ft. from SE lines of Blk. 6, Sur. No. 116 ..... Rigging up.

Gulf Coast Fields and Wildcats

(Continued from Page 70)

Humble O. & R. Co.'s No. 3 George, J. Rabb Sur., 1-, 300 ft. E of No. 7 ..... Drlg. shale 1,340 ft.

Humble O. & R. Co. and Gulf Prod. Co.'s No. 6-A George, J. Rabb Sur., 1,085 ft. E of No. 5 ..... Dry and abd. 5,765 ft.

Humble O. & R. Co. and Gulf Prod. Co.'s No. 13 Lockwood, J. Rabb Sur., 300 ft. E of No. 11 ..... Dry and abd. 5,630 ft.

Humble O. & R. Co. and Gulf Prod. Co.'s No. 18-A Lockwood & Sharp, J. Rabb Sur., 3,114 ft. E along N line of Tract 3 from NW cor. and 1,049 ft. S at right angles ..... Sand 5,300 ft; cmtd. csg.

Humble O. & R. Co.'s No. 14-B Lockwood & Sharp, J. Rabb Sur., 500 ft. from E line, 302 ft. from S line.. Spudded.

Humble O. & R. Co. and Gulf Prod. Co.'s No. 7 A. E. Meyer, J. Rabb Sur., 7,550 ft. E along S line of 275-ac. tract and 426 ft. N at right angles ..... Comp. 50 bbls. per hour; ⅝-in. choke, 5,300 ft.

Humble O. & R. Co.'s No. 8 Meyers, J. Rabb Sur. ..... Rig.

HIGH ISLAND—GALVESTON COUNTY

Yount Lee Oil Co.'s No. 3 Brousserd, M. Dunman Sur., 150 ft. E of center of W line of tract ..... Drlg. shale 6,325 ft.

Yount Lee Oil Co.'s No. 34 Cade, N. Fitzsimmons Sur., 856 ft. S of No. 33 ..... Drlg. shale 5,850 ft.

Yount Lee Oil Co.'s No. 35 Cade, N. Fitzsimmons Sur., 600 ft. S of No. 34 ..... Drlg. shale 5,002 ft.

Yount Lee Oil Co.'s No. 36 Cade, N. Fitzsimmons Sur., 600 ft. from S line, 240 ft. E of No. 34 ..... Derrick.

Yount Lee Oil Co.'s No 15 Smith, Martin Dunman Sur., 1,633 ft. from NW line, 315 ft. from SW line ..... Drlg. shale 5,225 ft.

Yount Lee Oil Co.'s No. 16 Smith, Martin Dunman Sur., 300 ft. SE of No. 12 and parallel to land line ..... Drlg. hard sand 5,320 ft.

ARIOLA—HARDIN COUNTY

Republic Prod. Co.'s No. 3 Ariola fee, Ariola Sur., 400 ft. S of No. 1 ..... Set 18 ft. of 4½-in. screen 4,320 ft.; flowed initially at rate of 50 bbls. per hr.; quit; swabbing.

BATSON—HARDIN COUNTY

Danciger O. & R. Co.'s No. 1 Hooks, 95 ft. S, 150 ft. W of NE cor. of Strip 13, Donoghue Sur. ..... Coring sand and shale 4,432 ft.

SARATOGA—HARDIN COUNTY

Rio Bravo Oil Co.'s No. 97 Jordit, Jordit Sur. ..... Set 31 ft. of screen 681 ft; comp. pumping 35 bbls. daily.

Rio Bravo Oil Co.'s No. 93 Jordit, Jordit Sur. ..... Rigging.

HOCKLEY—HARRIS COUNTY

John Deering's No. 3 Warren, T. A. Scully Sur., 200 ft. S, 100 ft. W of No. 2 ..... Sticky shale 2,700 ft.; T.A.

PIERCE JUNCTION—HARRIS COUNTY

Rio Bravo Oil Co.'s No. 14-A Settegast, J. Kopman Sur.. Set 51 ft. of 4½-in. screen 5,395 ft.; pumping 45 bbls. net oil.

Rock Drlg. Co.'s No. 1 Herman Est., J. Kopman Sur. No. 44, 788 ft. from E line, 38 ft. from N line of tract ..... Set 91 ft. of 4½-in. screen 4,689 ft.; comp. pumping 30 bbls. dly.

HANKAMER—LIBERTY COUNTY

Gulf Prod. Co.'s No. 1 Crowe & Jacobs, H.&T.C. Sur., Sec. 21, 900 ft. from W line, 1,700 ft. from S line of N 230 ac. of section ..... Pulling screen to deepen 4,921 ft.

HULL—LIBERTY COUNTY

Abercil Oil Co.'s No. 1 Barrow, Jesse Devore Sur., 64 ft. from N line, 700 ft. from E line of 10-ac. tract.. T.D. 6,452 ft.; standing.

Eclipse Oil Co.'s No. 1 Gordon, Jesse Devore Sur., 50 ft. S, 50 ft. W of NE cor. Empire 13 acres ..... Drlg. shale 6,150 ft.

CONROE—MONTGOMERY COUNTY

Alpha Oil Co.'s No. 4 Keystone Mills, L. Smith Sur., 467 ft. N and E lines of lease ..... Drlg. shale and shells 4,168 ft.

Alpha Oil Co.'s No. 5-A Krohn, S. H. Bryan Sur., 1995 ft. from N line in center E and W of tract ..... Drill pipe stuck 4,700 ft.

Atlas Oil Co.'s No. 1 Wahrenberger, R. C. Hamlet Sur., 300 ft. N, 600 ft. E of center of lease ..... Rig standing.

Bishop Oil Corp.'s No. 1 Rhodes, W. S. Rhodes Sur., 466 ft. from E line in center N and S of 25.8-ac. tract ..... Drlg. shale 1,428 ft.

H. M. Crighton's No. 1-A South Tex. Dev. Co., T.&N.O. Sur. No. 5, center of 16.31-ac. tract ..... Drlg. shale and lime 4,480 ft.

E. S. Craft's No. 1 Granger, T.&N.O. Sur. No. 14, 467 ft. out of NW cor. of 77-ac. lease ..... Drlg. shale 3,002 ft.

Feltex Oil Co.'s No. 2 Kirby-Bertrand, Wagers Sur., 1,267 ft. S of No. 1, in center of tract E and W.... Derrick.

Feltex Oil Co.-Kirby Pet. Co.'s No. 5 Folson, G. W. Wagers Sur., 466 ft. from S line in center of lease E and W ..... Comp. 40 bbls. per hour; ½-in. choke, 5,148 ft.

Feltex Oil Co.'s No. 2 Keystone Mills, L. Smith Sur. .. Comp. 75 bbls. per hour; ½-in. choke, 5,132 ft.

Gulf Coast Drlg. & Prod. Co.'s No. 1 J. L. Hensley, A. Steele Sur., 695 ft. from W line, 205 ft. from S line of 44 ac. ..... T.D. 5,030 ft.; drlg. 7-in. plug 4,-993 ft.

Gulf Coast Drlg. & Prod. Co.'s No. 6-B Keystone Mills, A. Steele Sur., 238 ft. W of SW cor. of J. L. Hensley lease and 467 ft. N at right angles to S line of lease ..... Comp. 25 bbls. per hour; ½-in. choke, 5,093 ft.

Gulf Coast Drlg. & Prod. Co.'s No. 7-B Keystone Mills, A. Steele Sur., 1,070 ft. W of No. 6 and 469 ft. N of S line of lease ..... Rig.

Gulf Coast Drlg. & Prod. Co.'s No. 8-B Keystone Mills, A. Steele, 2,771 ft. from E line, 467 ft. from S line.. Derrick.

Gulf Coast Drlg. & Prod. Co.'s No. 10 Keystone Mills, A. James Sur., 1,400 ft. from N line, 467 ft. from W line of lease ..... T.D. 5,084 ft.; drlg. 7-in. plug 5,-054 ft.

Harrison & Abercrombie's No. 5 Massey, John Massey Sur., 500 ft. from S line in center of tract E and W.. Drlg. hard shale and lime 4,860 ft.

Harrison & Abercrombie's No. 4 Wiggins, 750 ft. from N line and 288 ft. from W line of T. M. Wiggins Sur. ..... Sand and shale 5,100 ft.; cmtd. 7-in. csg. 4,995 ft.

Hi-Grade Oil Co.'s No. 1 South Tex. Dev. Co., T.&N.O. Sur. No. 5, 340 ft. from N line, 207 ft. from W line of lease ..... T.D. 5,074 ft; cmtd. 7-in. csg.

Hi-Grade Oil Co.'s No. 2 South Tex. Dev. Co., T.&N.O. Sur. No. 5, 345 ft. from W line, 234 ft. from S line of lease ..... Drlg. gumbo 4,725 ft.

Houston Oil Co.-Tide Water Oil Co.'s No. 3 Dobbins, Ransom House Sur., 435 ft. from N line, 2,549 ft. from W line of lease ..... Cmtd. 16-in. csg. 325 ft.

Houston Oil Co.-Tide Water Oil Co.'s No. 6 Hamman, C. B. Stewart Sur., 600 ft. from S line and 1,188 ft. from W line ..... Cmtd. 10-in. csg. 921 ft.

Humble O. & R. Co.'s No. 12-A Cartwright, John Davis Sur., 512 ft. from S line, 300 ft. from E line of lease Drlg. shale 1,261 ft.

Humble O. & R. Co.'s No. 2 Pearl Collins, L. Smith Sur., 300 ft. from S line, 525 ft. from E line of lease ..... T.D. 5,055 ft; cmtd. 7-in. csg. 5,-036 ft.

Humble O. & R. Co.'s No. 1 Dewitt, C. A. West Sur., center of Lots 66, 67, 78 and 79 ..... Drlg. shale 3,613 ft.

Humble O. & R. Co.'s No. 11 Madeley, Ransom House, 1,398 ft. from N line, 466 ft. from E line ..... Drlg. shale 2,713 ft.

Humble O. & R. Co.'s No. 35 Moore, Lemuel Smith Sur., 980 ft. NE of No. 30 ..... Comp. 90 bbls. per hour; ½-in. choke, 5,129 ft.

Humble O. & R. Co.'s No. 2 A. Moorehead, Treviathan Sur., 933 ft. W of No. 1 ..... Drlg. shale 5,060 ft.

Humble O. & R. Co.'s No. 5 Pistoffilo, W. M. Real Sur., 664 ft. S of No. 4 ..... Comp. 90 bbls. per hour; ½-in. choke, 5,144 ft.

Humble O. & R. Co.'s No. 34 South Tex. Dev. Co., Theo. Slade Sur., 933 ft. NE of No. 33 ..... Drlg. shale 1,954 ft.

Humble O. & R. Co.'s No. 1 Stream, C. A. West Sur., 720 ft. N, 620 ft. E of Navarro Oil Co.-Standard's No. 1 Meyers ..... Drlg. shale 3,833 ft.

Humble O. & R. Co.'s No. 3 Wiggins & Athey, L. Smith Sur., 500 ft. from SW line, 300 ft. from SE line.... T.D. 1,273 ft; cmtd. 10-in. csg. 1,-270 ft; standing.

W. M. Massie's No. 3 Hooper, Fannie Hooper Sur., 1,717 ft. from N line in center E and W ..... Comp. 70 bbls. per hour; ⅛-in. choke, 5,110 ft.

W. M. Massie's No. 4 Hooper, F. Hooper Sur., 2,404 ft. from N line in center E and W ..... Spudded.

Navarro Oil Co.'s No. 1-B House, W.C.Ry. Sur., Sec. 14, 675 ft. from W line, 330 ft. from S line of tract.. Drlg. shale and lime 4,337 ft.

Neversuch Oil Co.'s No. 4 South Tex. Dev. Co., T.&N.O. Sur. No. 5, 1,275 ft. N of No. 3 ..... Comp. 65 bbls. per hour; ½-in. choke, 5,132 ft.

Republic Prod. Co.'s No. 2 B. D. Griffin, Wilson Strickland Sur., 194 ft. from E line, 1,972 ft. from N line.. Comp. 102 bbls. per hour; ½-in. choke, 5,092 ft.

Southern Liberty Oil Co.'s No. 1 Allen, L. Smith Sur., 466 ft. from N line, 275 ft. from W line ..... Comp. 90 bbls. per hour; ½-in. choke, 5,086 ft.

Southern Liberty Oil Co.'s No. 1 Harris, John Davis Sur., 357 ft. from S line in center E and W of 22.7-ac. lease ..... Sand 5,129-47 ft; set screen.

Southern Liberty Oil Co.'s No. 2-B South Tex. Dev. Co., T.&N.O. Sur. No. 5 ..... T.D. 5,123 ft; cmtd. 7-in. csg. 5,-021 ft.

Standard Oil Co. of Kansas' No. 1-B Madeley, Ransom House Sur., 400 ft. from N line, 300 ft. from W line ..... Drlg. shale and lime 1,347 ft.

Standard Oil Co. of Kansas' No. 6 Smith & Ratcliff, W. C. Rhodes Sur., 316 ft. from S line, 290 ft. from E line ..... Cmtd. 10-in. csg. 1,357 ft.

Strake Pet., Inc.'s No. 3 Etheridge, S. H. Bryan Sur., 712 ft. W of No. 1, and 467 ft. from N line ..... Drlg. shale 3,707 ft.

Strake Pet., Inc.'s No. 1 Geo. Hamman, C. B. Stewart Sur., 467 ft. out of SW cor. ..... Drlg. shale 3,765 ft.

Sun Oil Co.'s No. 3 Foster, J. Bricker Sur., 933 ft. W of No. 2 and 466 ft. S of N line ..... T.D. 5,066 ft; cmtd. 7-in. csg. 5,-013 ft.

Sun Oil Co.'s No. 4 Foster, John Bricker Sur., 466 ft. out of SW cor. ..... Set screen 5,143 ft.

Sun Oil Co.'s No. 5 Foster, John Bricker Sur., 933 ft. S of No. 1 and 467 ft. from E line ..... Drlg. shale and lime 3,452 ft.

Sun Oil Co.'s No. 1 Clark, Wilson Strickland Sur., 409 ft. from N line, 467 ft. from E line ..... Cmtd. 10-in. csg. 1,352 ft.

Sun Oil Co.'s No. 3 B. E. Jones, Strickland Sur., 409 ft. from S line, 467 ft. from E line ..... Drlg. sand and boulders 1,443 ft.

Sun Oil Co.'s No. 5 Stewart, J. M. Real Sur., 680 ft. N of No. 1, and 467 ft. from E line ..... Drlg. shale 2,345 ft.

Sun Oil Co.'s No. 5 South Tex. Dev. Co., T.&N.O. Sur. No. 5, 164 ft. from N line in center E and W ..... Drlg. broken lime 4,732 ft.

The Texas Co.'s No. 21 Moody, 466 ft. out of SW cor. Ransom House Sur. ..... Drlg. shale, lime and shell 5,-000 ft.

The Texas Co.'s No. 6 Dudley, C. B. Stewart Sur., 1,-178 ft. W and 466 ft. N out of SE cor. of lease .... Drlg. sandy shale 4,434 ft.

The Texas Co.'s No. 26 Moody, Ransom House Sur., S 2,293 ft. 75 deg. W and 1,236 ft. S 15 deg. W from NW cor. of lease ..... Drlg. shale 3,054 ft.

The Texas Co.'s No. 27 Moody, Ransom House Sur., 2,632 ft. S 75 deg. W, and 3,178 ft. S 15 deg. E from NE cor. of lease ..... Drlg. shale, lime and boulders 4,276 ft.

The Texas Co.'s No. 14 Rhodes, W. S. Rhodes Sur., 1,060 ft. from W line, 1,470 ft. from S line ..... T.D. 5,010 ft; blew out.

Tide Water Oil Co.'s No. 3 Dean, W. C. C. Lynch Sur., 467 ft. out of SW cor. of lease ..... Cmtd. 10-in. csg. 916 ft.

Tide Water Oil Co.'s No. 4 Krohn, S. H. Bryan Sur., 1,812 ft. from N line, 467 ft. from E line ..... Drlg. shale and lime 1,400 ft.

REFUGIO—REFUGIO COUNTY

United Prod. Corp.'s No. 1-A M. F. Lambert, 666 ft. from N line, 822 ft. from W line of Hewa & Brown Sur. ..... Coring shale 4,775 ft.

WEST COLUMBIA—BRAZORIA COUNTY

The Texas Co.'s No. 5 Abrams ..... Drlg. shale and lime 3,001 ft.

HUMBLE—HARRIS COUNTY

The Texas Co.'s No. 32 House (W.O.), M. Owens Sur. .. T.D. 5,057 ft; pulling screen.

PORT NECHES—ORANGE COUNTY

The Texas Co.'s No. 3 Kuhn (W.O.), Mary E. Hall Sur., No. 2, 587 ft. S, 150 ft. W of NE cor. of survey..... T.D. 4,695 ft; plugged to 4,117 ft; set 21 ft. 8 in. of 4½-in. screen; swabbing fluid, 90% wtr.

The Texas Co.'s No. 1 Orange Nat. Bank, 150 ft. out of NW cor of lease, Jacob Beaumont Sur. ..... Rig.

SOUTH LOUISIANA FIELDS

ANSE LA BUTTE—ST. MARTIN PARISH

Great Dome Oil Co.'s No. 1 Coltz, 1,900 ft. E, 600 ft. N of SW cor. Sec. 22-7s-10e ..... Drlg. shale 1,275 ft.

ASSUMPTION PARISH

Barnsdall Oil Co.'s No. 1 Williams, 330 ft. out of NE cor. Sec. 35-14s-14e ..... Drlg. 510 ft.

CALCASIEU PARISH

Union Sulphur Co.'s No. 1 Stout, 1,237 ft. N, 1,167 ft. W of SE cor. Sec. 36-8s-8w ..... Drlg. gumbo 1,425 ft.

CAMERON PARISH

Southern Sulphur Co.'s No. 1 Gulf of Mexico, 330 ft. S, 335 ft. E of SW cor. Sec. 29-15s-10w ..... Rigging up.

CAMERON MEADOWS—CAMERON PARISH

Bertrand-Sutton Oil Co.'s No. 1 School, 500 ft. W, 20 ft. N of SE cor. Sec. 16-14s-13w ..... Sand 4,939-47 ft; cmtd. 7-in. csg. 4,738 ft; drlg. plug.

CHOCTAW—IBERVILLE PARISH

Standard Oil Co.'s No. 4 Myrtle Grove, 2,350 ft. S, 150 ft. W of NE cor. NW Sec. 52-9s-11e ..... Drlg. 1,220 ft.

DARROW—ASCENSION PARISH

Rio Bravo Oil Co.'s No. 2 Community, Sec. 21-10s-2e, 1,760 ft. S, 600 ft. W of No. 1 ..... Set 21 ft. of 7-in. screen 4,827 ft; failed to flow; puming 40 bbls. net oil.

Rio Bravo Oil Co.'s No. 1 Gumbel, 4,000 ft. W, 350 ft. S of NE cor. of S. Gumbel & Co. tract, Sec. 33-10s-3e.. Cored salt 6,052 ft.

EVANGELINE PARISH

O'Brien Bros.' No. 1 Haas, 3,597 ft. W, 350 ft. N of SE cor. fractional N½ Sec. 33-4s-1w ..... Drlg. shale 1,770 ft.

GUEYDAN—VERMILLION PARISH

Pure Oil Co.'s No. 2 Mulvey, Sec. 34-11s-1w, 1,515 ft. from N line, 1,150 ft. from E line of tract ..... Pulling screen to deepen 4,880 ft.

Pure Oil Co.'s No. 3 Mulvey, 690 ft. S, 3,369 ft. E of NW cor. Sec. 34-11s-1w ..... Lime showing oil 4,299 ft; set perforated pipe.

LOCKPORT—CALCASIEU PARISH

Magnolia Pet. Co.'s No. 3 State Bayou D'Inde, 865 ft. E, 570 ft. N of SW cor. NE Sec. 8-10s-9w ..... Capping piling for derrick.

HACKBERRY—CAMERON PARISH

Calcasieu Oil Co.'s No. 2 Hanszen, Sec. 14-12s-10w, 400 ft. W, 200 ft. S of No. 1 ..... Drlg. shale 5,210 ft.
East Hackberry Oil Co.'s No. 1 Landry, 2,957 ft. E, 156 ft. S of SW cor. Sec. 13-12s-10w, in Sec. 36..... Oil sand 2,613-33 ft.; T.A.
Gulf Ref. Co.'s No. 11 Irwin, Sec. 13-12s-10w, 200 ft. N and 100 ft. E of No. 9 ..... Drlg. gumbo 1,612 ft.
Wilfred Lahey's No. 1 Aroux, center 2-ac. tract, Sec. 36-12s-10w ..... Drlg. 950 ft.
Massert & Crusee's No. 1 Sutton, 656 ft. S, 325 ft. E of NW cor. Sec. 26-12s-10w ..... Drlg. shale 4,200 ft.
The Texas Co.'s No. 19-B State, 1,000 ft. E, 200 ft. N of NE cor. Sec. 13-12s-10w ..... T.D. 7,267 ft; flowed 975 bbls. P. L. oil first 9 hrs.; ¾-in. choke, 630 lbs. pressure; gravity 28.5°.
Union Sulphur Co.'s No. 5 Gulf Land-Humble lease, Sec. 11-13s-10w, 300 ft. N of No. 1 ..... Salt 6,389-6,482 ft.

IOWA—CALCASIEU AND JEFF DAVIS PARISHES

Magnolia Pet. Co.'s No. 1 Gillson, 330 ft. out of SE cor. NE Sec. 12-9s-7w ..... Cmtd. 9⅝-in. csg. 5,416 ft.
Magnolia Pet. Co.'s No. 1 Willett, 330 ft. N and E out of SW cor. NW Sec. 7-9s-6w ..... Gumbo 1,100 ft; running surface csg.
Shell Pet. Corp.'s No. 4 Fontenot, Sec. 7-9s-6w, 330 ft. out of NW cor. of lease ..... Spudded.
Shell Pet. Corp.'s No. 4 Heyd, 2,123 ft. W, 1,310 ft. S of NE cor. Sec. 13-9s-7w ..... Drlg. shale 4,401 ft.
Shell Pet. Corp.'s No. 1 Stafford, 825 ft. S, 325 ft. E of NW cor. Sec. 13-9s-6w ..... T.D. 7,021 ft; plugged to 6,923 ft; cmtd. 5-in. csg. and 54 ft. of screen.

JEFFERSON DAVIS PARISH

Humble O. & R. Co.'s No. 2 Devilbiss, 1,850 ft. S, 350 ft. W of NE cor. Sec. 14-9s-4w ..... Drlg. shale 5,002 ft.

JENNINGS—ACADIA PARISH

Yount Lee Oil Co.'s No. 12 Houssierre-Latrielle, Sec. 47-9s-2w, 300 ft. SW of No. 5 and 400 ft. NE of No. 4 ..... Drlg. hard sand 5,639 ft.

LA FOURCHE PARISH

V. N. Miller's No. 1 Sunbury, 150 ft. N, 100 ft. E of SW cor. Sec. 65-15s-15e ..... Drlg. gumbo 993 ft.
Southern Sulphur Co.'s No. 1 State-Bay Marchand, 617 ft. E, 710 ft. S of SW cor. Sec. 20, in Sec. 29-22s-23e. Spudded.

LAKE WASHINGTON—PLAQUEMINES PARISH

Humble O. & R. Co.'s No. 9 Cockrell-Moran, 3,212 ft. E, 580 ft. S of Triangulation Station Washington Twp. 20s-26e ..... Shale 1,187 ft.

PLAQUEMINES PARISH

The Texas Co.'s No. 8 Garden Island, 497 ft. E, 172 ft. N of SW cor. Sec. 107-23s-32e ..... Rock 2,150 ft.

PORT BARRE—ST. LANDRY PARISH

The Texas Co.'s No. 15 Botney Bay, 100 ft. out of most southerly NE cor. of lease, Sec. 4-6s-5e ..... Sand 3,374 ft; cmtd. csg.

STARKS—CALCASIEU PARISH

Gulf Ref. Co.'s No. 33 Lutcher-Moore, 1,863 ft. N, 650 ft. E of SW cor. Sec. 19-9s-12w ..... Comp. 1,400 bbls. daily, 3,445 ft.

SWEET LAKE—CAMERON PARISH

Pure Oil Co.'s No. 11 Yount Lee, Sec. 12-13s-8w, 800 ft. S 66 deg. 42 min. from No. 9 ..... Drlg. sticky shale 8,030 ft.

ST. BERNARD PARISH

Southern Sulphur Co.'s No. 1 State-Lake Borgne, 350 ft. N, 330 ft. E of SE cor. Sec. 33-13s-15e ..... Rig.
Southern Sulphur Co.'s No. 1 Lake Levy, 400 ft. S, 500 ft. N of SW cor. Sec. 28-13s-15e ..... Rigging up.

SULPHUR—CALCASIEU PARISH

Union Sulphur Co.'s No. 727 fee, 75 ft. N, 1,270 ft. W of SE cor. SE NW Sec. 29-9s-10w ..... Drlg. sand 5,350 ft.
Union Sulphur Co.'s No. 780 fee, 465 ft. N and 536 ft. E of center of Sec. 29-9s-10e ..... Drlg. rock 2,020 ft.
Union Sulphur Co.'s No. 783 fee, Sec. 29-9s-10w ..... Drlg. shale 3,512 ft.

TERREBONNE PARISH

The Texas Co.'s No. 8 State-Caillou Island, 1,050 ft. S, 2,770 ft. E of NW cor. Sec. 20-23s-20e ..... Drlg. shale 1,510 ft.
The Texas Co.'s No. 8 State-Dog Lake, 4,067 ft. W, 1,877 ft. N of SE cor. Sec. 31-21s-16e ..... Drlg. shale 3,325 ft.
The Texas Co.'s No. 18 State-Lake Barre, 1,876 ft. W, 551 ft. S of NW cor. Sec. 30, in Sec. 25-21s-20e .... Salt 2,604 ft.

VERMILLION PARISH

Shell Pet. Corp.'s No. 1 Herbert, 2,310 ft. W, 330 ft. N of SE cor. Sec. 10-15s-1e ..... Drlg. hard sand 7,606 ft.

TEXAS

MISCELLANEOUS WILDCATS

AUSTIN COUNTY

Cranfill-Reynolds Co.'s No. 1 Swearingen, 1,705 ft. NE along SE line from S cor. of C. K. Hamm Sur., and 336 ft. NW at right angles ..... S.W. sand 4,540 ft.; abd.

BRAZORIA COUNTY

Amerada Pet. Corp. and Rycade Oil Corp.'s No. 3 Seaburn, 1,250 ft. E of W line and 4,550 ft. S of N line of Austin & Williams Sur. ..... Set 94 ft. of 9⅝-in. screen on bottom of full string 9⅝-in. csg.; flowed some oil but went to wtr.; plugging back.
E. A. Anderson et al's No. 1 Reynold, Johnson, Walker & Borden League, 5,502 ft. from W line, 850 ft. from W line of 122-ac. lease ..... Derrick; moving in rig.
Danciger O. & R. Co.'s No. 3 Hunt, Pledger, 6,550 ft. from E line, 5,550 ft. from S line of W. Carson Sur. .. T.D. 6,853 ft.; sand 6,752-6,850 ft.; waiting on csg.

BRAZOS COUNTY

Adkins & O'Neill's No. 1 Clay, 1,150 ft. E, 5,750 ft. N of SW cor. of Walter Southerland Sur. ..... Shale 3,534 ft; S.D.; W.O.
F. H. Scott's No. 1 Klintworth, I. Curd Sur., 300 ft. NE line, 400 ft. SE line of tract ..... Moving in derrick.
Mills & Jones' No. 1 Gan, John S. Roberts Sur., 255 ft. W, 1,051.72 ft. S of NE cor. of 138-ac. tract .... Drlg. shale 1,006 ft.

COLORADO COUNTY

Danciger O. & G. Co. and L. E. Hults' No. 1 C. L. Raver, B.B.B.&C. Sur., Sec. 1, 990 ft. out of SW cor. of 477-ac. tract ..... Drlg. S.W. sand 4,276 ft.
Fabrigus & Poole's No. 1 Lake Side Irrigation, 1,500 ft. SE, 500 ft. NE NW cor. Patrick Real Sur. ..... T.D. 1,445 ft; cmtd. 12½-in. csg. 1,150 ft.
Humble O. & R. Co.'s No. 1 John McShane, L.&G.N. Sur., Sec. 42, 466 ft. out of NE cor of tract ..... Drlg. shale 6,191 ft.
McCullough Oil Co.'s No. 1 Kansteiner, Lelander Beason Sur., 300 ft. out of NE cor. of tract ..... Derrick.
Plymouth Oil Co.'s No. 1 Ream, 330 ft. out of NE cor. of L.&G.N. Sur. No. 47 ..... D.S. test 6,140-6,200 ft; showed 400 ft. of cut oil and mud in 7 minutes, ¾-in. choke.

FORT BEND COUNTY

Naylor & DeCosta's No. 1 Naylor, 4,350 ft. N, 55 deg. E from SW cor. 463-ac. tract in Christman Sur. .... T.D. 7,014 ft; P.B. to 5,600 ft.

GRIMES COUNTY

Koch et al's No. 1 Haferkamp, Samuel Fulton Sur., 335 ft. from S line, 347 ft. from E line of 189 acres.. No report.
Petroleum Southwest Co.'s No. 1 Greer, Pat O'Connor Sur., 300 ft. from W line, 400 ft. from N line of 150-ac. tract ..... Drlg. gumbo 911 ft.

HARRIS COUNTY

H. H. Sloan's (Weatherall) No. 1 Paden, 1,320 ft. from N line, 1,320 ft. from W line of Brock Sur. ..... Cmtd. 10-in. csg. 491 ft; T.D. 520 ft.; changing rigs.
Burns, Ogg & Houston's No. 1 Kenning, H.&T.B. Sur., 330 ft. S line and 550 ft. W line ..... Spudded.

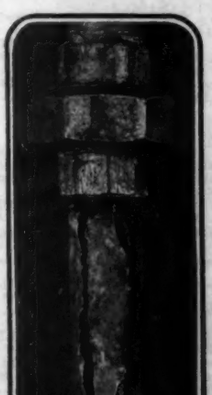
B PRODUCTS for pumping wells
The KEY to LOWER LIFTING COSTS
CORRECTLY DESIGNED ** ECONOMICALLY PRODUCED
REASONABLY PRICED

Try TRIADS—service records prove their merits

Built to outlast and outperform. Available at your Supply Store—try TRIADS, you'll like them!

BRADFORD MOTOR WORKS INC.
OIL WELL SUPPLIES
BRADFORD, PA. TULSA, OKLA.
EXPORT OFFICE—30 CHURCH ST.—NEW YORK CITY

This would not have happened if the threads had been filled with



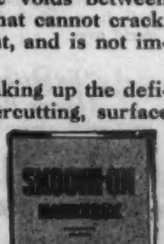
SMOOTH-ON No. 1

USE Smooth-On No. 1 as standard practice in making up all threaded joints and you will have fewer interruptions and an astonishing absence of thread joint leaks.

Smooth-On No. 1 is primarily a thread joint filler, made to hold anything from superheated steam to thin oil under high pressure, but to permit the joints to be taken apart in case of necessity. It lubricates the threads to make assembling easy and puts into the voids between them a metallic filler that cannot crack, shrivel, dry or blow out, and is not impaired by expansion.

Smooth-On No. 1 is peculiarly effective in making up the deficiency of unequal pitch or taper, slight undercutting, surface corrosion, pits or battered spots, and under these conditions will very often produce a thorough seal where tightness could not be produced in any other way.

Make some trial installations where leakage has been obstinate.



Get Smooth-On No. 1 in 1 or 5-lb. can or larger keg from your supply house or if necessary from us direct.

SMOOTH-ON MFG. CO., Dept. 66
570 Communipaw Ave., Jersey City, N. J.

Do it with SMOOTH-ON

SOUTH AMERICAN FIRE

extinguished by Kinley Company

Mr. M. M. Kinley was called to Colombia, South America, in March, by the Gulf-Venezuela Company, to take charge of operations in connection with a fire on their Barco Concession, which had raged for several weeks. Mr. Kinley made the trip from Tulsa to Maracaibo via the Pan American Airway Express, in two days.

The well was successfully capped while burning, after 21 days of preparation. Explosives were used only to remove a gooseneck, in the preparatory stages.

The forests in the section of Colombia where this operation was conducted, are infested by primitive wild Indians armed with very powerful bows. Arrows shot from a considerable distance by these Indians will readily pierce entirely through a man's body. It is said that no white man has ever seen one of these Indians, but several have recently met death from their arrows.

The Kinley Company's services in extinguishing oil and gas well fires are in demand the world over.

"Experience Always Pays"

M. M. KINLEY COMPANY
Tulsa, Oklahoma

Specializing in Capping Wild Wells—Extinguishing Well Fires

C. & C. Drlg. Co. and Mephail's No. 1 Erhardt, C. H. Delesdenier League ..... Cmtd. csg. 500 ft.
Hamilton et al's No. 1 Hargroves, W. C. Ry. Sur. No. 10, Blk. 1; 1,750 ft. from E line, 645 ft. N line .... Derrick.
H. B. Jordan's No. 1 Cochran, J. L. Jordan Sur., 1,950 ft. from S line, 1,920 ft. from E line ..... Drlg. gumbo 127 ft.
Magnolia Pet. Co.'s No. 1 Koba, 923 ft. from E line, 1,650 ft. from N line of lower J. M. Hooper Sur. .... Cored sand showing oil and gas 5,561-69 ft; may run csg. to test.
Magnolia Pet. Co.'s No. 1 Marteus, Joseph House Sur., 600 ft. from W line, 5,600 ft. from S line of tract .. S.W. sand 5,671 ft.
Polk Drlg. Co.'s No. 1 Malcomson, A. Schouten Sur., 500 ft. from N line, 1,800 ft. from E line of 233-acre Daniels tract ..... S.D. 1,435 ft.
Sinclair Prairie Oil Co.'s No. 1 Kirmayer, Jesse Denton Sur., 357 ft. S, 401 ft. W of SE cor. Mrs. Willie Moore 200-ac. tract in Kirmayer 800-ac. tract ..... Rigging up.

JACKSON COUNTY

The Texas Co.'s No. 1 Mitchell, S. F. Austin League, 450 ft. W, 450 ft. S of NE cor. of 63-ac. tract, Lot 28, Clement Subd. ..... Twisted off 3 joints drill pipe, 3,847 ft; fishing.
Turnbull et al's No. 1 Mauritz, John Davis Sur., 330 ft. from W line of 200-ac. tract and 330 ft. N of center of G.H.&S.A. Ry. Sur. ..... Drlg. gumbo and lime 1,972 ft.

JEFFERSON COUNTY

Caroil & Miller's No. 1 Mashman, W. B. Dyches Sur., 462 ft. W of highway and 105 ft. S of NE line of 13-ac. tract ..... Drlg. shale 1,295 ft.
Coast O. & G. Co.'s No. 1 Young, Joseph Grigsby Sur., 350 ft. from E line, 160 ft. from S line of 40-ac. tract in Blk. F-5, Lot 6 ..... S.D. 4,843 ft.
Blam & Denny's No. 2 Broussard, John McGaffey Sur. .. Hard sand 3,440 ft; fishing.
W. J. Parker's No. 1 Rorck, A. Williams Sur. ..... Drlg. gumbo 1,810 ft.

LIBERTY COUNTY

C. G. Hamill's No. 1 McNair, Wm. Harris Sur., 2,700 ft. from E line and 525 ft. from S line of tract ... Rigging up.
Yount Lee Oil Co.'s No. 1 E. W. Boyt, H.&T.C. Sur., Sec. 17, 300 ft. from S line, 2,440 ft. from E line of section ..... Drlg. shale 6,984 ft.

MATAGORDA COUNTY

Cockburn Oil Corp.'s No. 5 Hawkins, Shepherds Mott, 2,260 ft. SE, 1,800 ft. NE of W cor. Daniel McCarthy Sur. ..... T.D. 5,330 ft; drlg. sidetracked hole, shale 5,272 ft.
Humble O. & R. Co.'s No. 2 Pierce est., 1,900 ft. NE, 466 ft. NW at right angles out of SW cor. of Pierce estate, same being NW cor. of W. S. and L. B. Hunt tract, W. Carson Sur. ..... Drlg. shale 6,025 ft.
United North & South Dev. Co.'s No. 1 Stoddard (W.O.), 150 ft. W, 545 ft. N of SE cor. of Blk. 52, Buckeye townsite ..... T.D. 7,926 ft; cored oil sand 7,-860 ft. in sidetracked hole.
United North & South Dev. Co.'s No. 1 Unit 6 (No. 2 Stoddard), 25 ft. each way out of NW cor. of Lot 19, Buckeye Townsite ..... T.D. 6,060 ft; sidetracking 5,593 ft.
United North & South Dev. Co.'s No. 1 Unit 14 (No. 1 Dr. Pletner), 1,210 ft. SE of No. 1 Stoddard and 136 ft. W of right of way of Collegeport branch of St. L.&B.M.R.R., Buckeye ..... Cored oil sand 7,715-7,800 ft.
United North & South Dev. Co.'s No. 1 Unit 25, 1,335 ft. S, 1,000 ft. E of No. 1 Unit 6 ..... Drlg. sticky shale 2,325 ft.

POLK COUNTY

Boone, Clark & Boone's No. 1 Tex. Long Leaf, 2,325 ft. NW along NE line of D. B. McComb Sur. from E cor. and 1,188 ft. SW at right angles ..... Drlg. shale 2,759 ft.
Englewright et al's No. 1 Kingsbury, A. Viesca Sur., 150 ft. NW and 1,114 ft. SW of NW cor. of H. J. Pratt 20 acres ..... Shale 4,680 ft; T.A.
Carl B. King Drlg. Co.'s No. 1 U. S. Alabama Indian Reservation, 3,245 ft. from SW line, 5,022 ft. from SE line of Thomas Colville Sur. ..... Shale 3,100 ft; S.D.
Kirby Pet. Co.'s No. 1 Kirby Lbr. Co., 466 ft. out of NW cor. of James Stephenson Sur. ..... Rig.
Roxie Oil Co.'s No. 1 Reed, A. Viesca Sur., 150 ft. out of NW cor. of 479-ac. lease ..... T.D. 4,311 ft; cmtd. 6⅝-in. csg 4,239 ft.; drlg. plug.
Dick Schwab's No. 1 Craig, Mary C. Swinney Sur., 330 ft. out of NE cor. of J. A. Munson 80-ac. tract .... Drlg. gumbo 1,800 ft.

REFUGIO COUNTY

Humble O. & R. Co.'s No. 5 O'Connor, Florentine Rice Sur., 933 ft. NW of No. 4 ..... Coring sandy shale 3,249 ft.
Geo. M. Smith's No. 1 J. M. O'Brien, 450 ft. W of center of E line of Winfield Sur. ..... Sand 4,396-4,403 ft.; flowed 346 bbls. P.L. oil in first 15 hrs., ¼-in. choke; 528 lbs. pressure; gravity 21.5° (cor.).

TYLER COUNTY

Republic Prod. Co. and Houston Oil Co.'s No. 1,014-E (No. 2 Sterne fee), Adolph Sterne Sur., 1,300 ft. S, 400 ft. W of No. 1 Sterne fee ..... Drlg. shale 5,814 ft.

VICTORIA COUNTY

Stonelelgh O. & G. Co.'s No. 1 Terrell, SW cor. of R. Manchola Sur. No. 2 ..... Sand 4,430-37 ft; set 20 ft. perforated pipe; comp. gas well, 1,500 lbs. on tubing and 300 lbs. on csg.; 7/32-in. choke.
The Texas Co.'s No. 7 McFaddin, 6,600 ft. S 15 deg. W, 450 ft. N 75 deg. W at right angles from the NE cor. of the A. J. Gray Sur. ..... T.D. 1,176 ft; blowing gas and mud.

WALLER COUNTY

Trapshooter Reilly Oil & Royalty Co.'s No. 1 Menke, Juste Llende Sur., 400 ft. at right angles from NW line at 350 ft. at right angles from E line of 330-ac. tract ..... Drlg. shale 2,392 ft.

WASHINGTON COUNTY

Cline, Taylor et al's No. 1 Chadwick, Isaac Lee Sur., 560 ft. from N line, 1,000 ft. from E line of 320-ac. tract ..... Drlg. sandy shale 2,174 ft.

WHARTON COUNTY

Pure Oil Co.'s No. 1 Stewart, 2,410 ft. NW, 1,650 ft. NE of S cor. of Sec. 25, Morris & Cummings Sur. .... Drlg. brittle shale 6,672 ft.
Smith & Daniels' No. 1 Mitchell, H.&T.C. Sur. No. 8, 330 ft. from NE line of NE 80-ac. tract in center of tract NW and SE ..... T.D. 6,875 ft; plugged to 3,250 ft.

TEXAS AND SEABOARD

C. P. Ames, chairman of The Texas Company, Harry T. Klein, vice president and general counsel, and R. Ogarrio, vice president, have been elected directors of Seaboard Oil Co. of Delaware, representing The Texas Company in recognition of its large stockholdings in Seaboard. They succeeded Edward B. Allen, Charles T. Fisher and J. Ford Johnson, Jr.

In reply to question if there was any truth in the rumors that The Texas Company planned to take over the Seaboard Oil Co., President Lovejoy of Seaboard said: "Not that I know of; they are substantial stockholders."

TAX DIVERSION UNPOPULAR

WASHINGTON, D. C., May 22.—Proposals to divert the revenues from the gasoline taxes to purposes other than the building and maintenance of highways appears to be increasingly unpopular. In a great majority of the legislatures of 44 states, which were in session during the early part of the year, bills were presented to utilize this revenue for various purposes, but in only four were they passed.

Cut Storage Losses

OCECO

Vent Valves Limit Evaporation

The savings soon pay for the vent valves and return a big profit. Present connections on old tanks usually adaptable for attaching new fittings. We'll show you how. Write to—

THE OIL CONSERVATION ENGINEERING CO.
877 Addison Road, Cleveland, Ohio

A complete reproduction plant. Photostat Copies, Blue Printing, Kodalith Negatives, Kodaks. Movie Cameras. Drawing Materials. Blue Print Paper and Cloth.

TULSA CAMERA RECORD COMPANY
317 So. Boston Tulsa, Okla.

SPERRY-SUN WELL SURVEYING CO.
1608 WALNUT STREET
PHILADELPHIA, PA.
DALLAS, TYLER, HOUSTON AND WICHITA FALLS, TEXAS; TULSA, OKLA. AND LOS ANGELES, CALIF.
SURWEL • SYFO
UNDERGROUND WELL SURVEYING SERVICE

RENEW YOUR SUBSCRIPTION TO THE OIL AND GAS JOURNAL.

Consider Many Factors in Improving Octane Number

(Continued from Page 48)

in a naphtha of much greater volatility. For example, the fill of a 70 octane number naphtha in Series 3 and 4 was approximately 16 per cent, as compared to

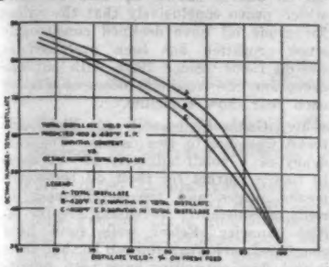


Figure 5—Heavy naphtha cracking distillate from natural heavy naphtha once-through coil-and-soaker operation

24 per cent when recycling. The only possible economical application of the latter operation would be to a refinery situation in which volatility is at a premium.

TABLE 5—COMPARISON OF DEGRADATION ON CRACKED AND STRAIGHT-RUN NAPHTHA OPERATION

Octane No. range—	Per cent degradation per octane number improvement
Cracked Heavy Naphtha	
82. to 80.2 (R)	1.21
82.0 to 81.2 (R)	1.42
82.0 to 70.0 (O)	0.59
82.0 to 80.0 (O)	0.76
Straightrun Heavy Naphtha	
31 to 59.2 (R)	0.28
31 to 60.6 (R)	0.39
31 to 49.0 (O)	*0.29
31 to 59 (O)	0.30

(R) Recycle operation undercutting end-point. (O) Once-through operation. *Extrapolated.

Butane production from naphtha cracking increases with the degree of octane number improvement. This production can be absorbed in the gasoline up to a certain point, after which the butane must be discarded as fuel. No arbitrary figure for butane inclusion in the gasoline can be set, since it depends entirely upon the individual refinery situation.

As has been pointed out previously, no attempt was made to fractionate the distillate from the once-through operation to a specified endpoint. In Figure 5 the naphtha yields, after rerunning to 400° F. and 420° F. endpoint, are plotted against the octane number of the total distillate. This comparison is for coil-and-soaker once-through cracking of straightrun stocks. A maximum loss of 4 per cent on fresh feed occurs when rerunning to 420° F., and 8 per cent when producing a 400° F. endpoint by redistillation.

At this point it may be well to discuss briefly the limitations to operation which were encountered in the experimental work. All the runs were made at maximum furnace capacity. The recycle operation on the natural stock in the 940° to 970° F. temperature range presented no operating difficulties. Similar operation on the cracked stock gave evidence of short runs due to release-nozzle coke trouble. This condition could undoubtedly be overcome by the use of a coke drill.

The once-through coil-and-soaker operation with a coke drill presented no difficulties in the 917° to 980° F. coil-outlet temperature range. Runs of 30 days are not uncommon. Operation with coil-outlet temperature of 980° F. to 995° F. was limited to short runs due to soaker coking. The coil-only flow on straightrun naphtha required high coil-outlet temperatures to secure octane number improvement. Operation at the higher temperatures was seriously limited by tube-metal temperatures due to the high rates of heat input.

The once-through operations on cracked naphtha were limited to relatively short runs due to coke formation. The coil-only flow was hampered by coil coking, and the coil-and-soaker operation was characterized by frequent drilling of the release nozzle.

Although no attempt has been made in this report to interpret the economic significance of the foregoing results, the yields and operating data presented are considered adequate for an economic analysis of any refinery situation.

TABLE 6—COIL CAPACITY IN BARRELS PER DAY VS. OCTANE NUMBER OF TOTAL DISTILLATE
(Barrels per day)

	Straightrun heavy naphtha					Cracked heavy naphtha		
	1	3	4	6	8	2	5	7
Series of run description distillate octane No.	Recycling at 940° F. at 800 lb.	Recycling to 400° F. endpoint at 800 lb.	Once-through coil-and-soaker at 800 lb.	Once-through coil only at 800 lb.	Once-through coil-only at 250 lb.	Recycling at 930° F. at 800 lb.	Once-through coil-and-soaker at 800 lb.	Once-through coil-only at 800 lb.
65	3,100	....	6,250	5,050	4,300	....	....	....
70	2,650	4,000	6,000	4,700	3,600	....	6,100	4,800
75	2,200	....	5,750	4,400	2,800	....	....	4,650
80	1,800	....	5,500	4,000	....	2,150	....	4,500

Gulf Coast Fields

(Continued from Page 70)

bbls. net oil with a heavy water output. So far development on the dome has been disappointing with three other deep dry holes having been drilled.

Manvel Field

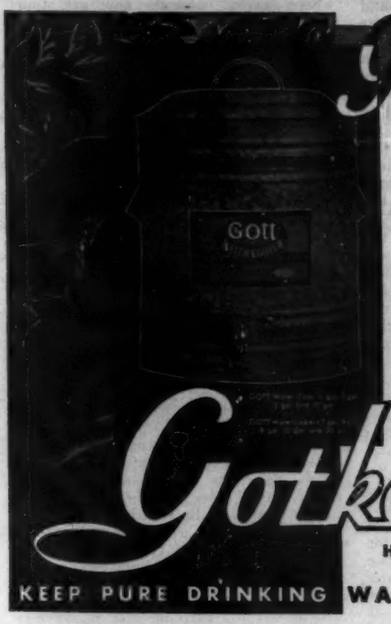
The Texas Company has added another good producer to its Manvel Field with the completion of No. 1 Davis flowing 37 bbls. of oil daily through three-eighths inch choke from the upper or Miocene sand at a total depth of 3,871 feet. This is the fourth producer for this sand. Two other wells, including the discovery well, are producing from the deeper Oligocene sands below 5,000 feet. This company has one other rig running and has made location for four other tests in the systematic program of development which it is carrying on.

Rabbs Ridge

Further defining of the Rabbs Ridge, or Thompson, Field of Fort Bend County, was indicated the past week with the abandonment of two deep dry holes on the southeast side, these being Humble Oil & Refining Co. and Gulf Production Co.'s No. 6-A George, quit at 5,765 feet, and the same operators' No. 13 Lockwood, total depth 5,630 feet. Both are outside offsets to producing wells in the 5,300-foot pay horizon. On the extreme northwest side, Cullen & West's No. 1 Gehr also is drilling well below the producing horizon without finding anything. At latest report it was in shale and lime at 5,915 feet and dry, apparently defining the field in that direction. Three producers were completed in the field.

Conroe Field

Production of the Conroe Field has mounted to approximately 75,000 bbls. daily, of which 20,000 bbls. is from 31 wells, which owners claim are in the "Upper Cockfield" sand and not under proration restrictions applied to the Conroe Field proper. The daily allowable of wells on 20-acre units in the main Conroe sand is 154 bbls. Considerable confusion exists in connection with proration over the "Upper Cockfield" sand wells. Because of the clause in the state conservation law which provides that production of new fields cannot be prorated until it reaches 10,000 bbls. daily, wells completed in the Upper Cockfield sand, which has been designated as a new field, have been permitted to flow unrestricted so long as actual physical waste has not been created. So far only 11 wells have definitely been recognized as being in the Upper Cockfield sand and the production of these has not reached 10,000 bbls. daily. Operators of 20 additional wells claim



Pure... clear drinking water

When you have a GOTT Water Cooler handy, you will always be assured of a fresh supply of pure drinking water kept delightfully cool. Order one from your supply store... now!

Gotkool

H. P. GOTT MFG. CO., Winfield, Kansas

KEEP PURE DRINKING WATER ALWAYS HANDY

PETROLEUM REFINING EQUIPMENT

We build combination Compression and Rectification plants to recover stabilized gasoline from refinery still gases.

Write for Estimates and Quotations on

PETROLEUM REFINING EQUIPMENT
FRACTIONAL DISTILLATION
VAPOR RECOVERY AND STABILIZER PLANTS
HEAT EXCHANGE DEVICES
A.S.M.E. CODE VESSELS
CASTINGS AND FORGINGS—ALLOY MATERIALS
COMPLETE PROCESS INSTALLATIONS OF
SKIMMING, CRACKING, VACUUM STAGE DISTILLATION
VISCOSITY BREAKERS
COMBINATION UNITS ASPHALT PLANTS

J. P. DEVINE MFG. CO., INC.
MOUNT VERNON, ILL.
SUBSIDIARY OF MT. VERNON CAR MFG. CO.

C. M. HEETER, SONS & CO., INC.
MAIN OFFICE AND WORKS, BUTLER, PA.

"Heeter's" Packers and Swabs

Heeter's Improved Patent Swabs, Corrugated Friction Sockets, Wire Line Pumping Outfits, Sand Pumps and other Gas and Oil Well Materials

Read the Classified Bargains on page 95 of this week's issue.

these producers also are in that sand and have been attempting to flow their wells unrestricted. Representatives of the Railroad Commission made a thorough check of the field the past week and pinched in the production of the 31 wells claimed to be in the Upper Cockfield to a total less than 10,000 bbls. daily, but these wells again have been opened and are making around 20,000 bbls. Operators are unwilling to pinch in their wells to a total below 10,000 bbls. because of the doubt as to whether most of these 31 wells are in the Upper Cockfield or the main Conroe sand. The difficulty of determining which sand these wells are producing from has arisen because of the fact that the depths of the two sands along the eastern and southern margins of the field are approximately the same

Increase in Wildcatting

Further increase in wildcatting was reflected during the week with the starting up of additional wildcats in scattered sections of the coast. In Liberty County, southeast of the Liberty Field, C. G. Hamill is rigging up for a 5,000-foot test in the McNair tract in the Williams Harris Survey. In Harris County, Hamilton and associates have made location for No. 1 Hargroves in W. C. Ry. Survey No. 10, Block 1, a mile west of Fairbanks, and in the Bammell district C. & C. Drilling Co. and Van Phail have a wildcat on the Erhardt 100 acres in the C. H. Delesdenier League, which now has surface casing run to 500 feet. Burns and associates also have a new wildcat test in the H.&T.B. Survey, Abstract 391, east of Crosby. Due to the Tomball-Huffsmith play which has been going on, Harris County has proved the biggest lure to the wildcatter and a dozen wildcats either are drilling or locations have been made.

Hockley Dome

At Hockley, John Deering has abandoned temporarily his No. 3 Warren after drilling to 2,700 feet in sticky shale. This is 200 feet south and 100 feet west of No. 2 Warren, completed last February as a 500-bbl. producer in a sand at 2,426 feet. The latter still is making about 50 bbls. daily as Hockley's best well to date.

Brazos County

On the Kurten prospect in Brazos County, F. H. Scott is moving in derrick material for his No. 1 Klintworth, in the I. Curd Survey. This wildcat, which will spud before June 1, will go to 3,750 feet for a thorough test through the Wilcox, Mr. Scott, who is an experienced operator of many years, has two adjoining blocks consisting of a total of approximately 12,000 acres solid. The area has a northwest and southwest closure with a southeast dip and has evidence of a considerable uplift. Considering the interest which has been shown in the possibilities of active development in Brazos County and Grimes County, which adjoins Brazos to the east and where several wildcats now are under way, the Scott test will be of particular importance. This prospect is believed to be somewhat similar to the Clay Creek Dome, 30 miles to the southwest along the same trend and in which production has been obtained from the Sparta, Queen City, Carrizo and Wilcox sands.

Sales Committee Reports on Use of Specifications

(Continued from Page 27)

of natural gasoline by East Coast refiners which helped the natural gasoline market considerably. Most of this material was 18 and 20-pound Reid vapor pressure which moved in tank ships from Gulf ports. Such movements of natural gasoline should increase with the increase of "volatility consciousness" on the East Coast and the cheap transportation of stabilized natural gasoline by way of tankers from the Gulf ports.

Bulk station blending has not increased as rapidly as was indicated a year ago. It remains to be determined whether the failure of refiners to ship natural gasoline direct to bulk terminals is due to limited unloading and storage facilities or to their uncertainty as to the competency of the men at these terminals to properly do the blending. Another possibility is that refiners desire to limit the use of natural gasoline and retain control of its percentage in motor fuels by forcing it through their direct hands at the refineries. Or possibly the savings shown by bulk station blends are not so great for the remainder of the industry as for those first adopting this method of operation.

It is well to note here that one of the large companies has been successful in delivering the output of its affiliated company's natural gasoline plants through oil pipe lines from Oklahoma to its Gulf Coast refinery.

The continued stressing of octane number by refiners has resulted in increased cracking and consequent production of lighter hydrocarbons which must be controlled by fractionation at refineries the same as at natural gasoline plants. This has caused the continued trend toward purchase of stabilized grades of natural gasoline of the lower vapor pressures principally in the ranges from 14 to 20 pounds.

The increasing sales of lower vapor pressure natural gasoline have resulted in increased activity in the manufacture and sale of the liquefied petroleum gases, i.e., butanes, propanes and mixtures of these. Low industrial activity has not assisted in the problem of disposing of these products, but with increasing industrial activity which we hope for next year, a considerable increase in demand for these products should develop.

During the past year we had a splendid sample of the satisfactory operation of our new vapor pressure grading system in meeting large and small demands. As increased buying in the late summer of 1932 started an upward trend in prices, the refiners gradually advanced the vapor pressure of the natural gasoline purchased thus reducing the volume used, and increasing the production of the natural gasoline manufacturer until an equilibrium was established and prices stabilized. This process has been reversed this spring and the orders call for the lower vapor pressure product.

From the foregoing and a general view of the natural gasoline industry, the necessity for flexibility of operations is quite evident and should be accepted and practiced to an even greater extent in the future in order to be in position to take advantage of natural gasoline's ever changing position in the petroleum industry. This flexibility on the part of the manufacturer should consist in having the proper fractionating equipment at his gasoline plants to enable him to manufacture whatever grade of natural gasoline can be sold to the best advantage.

In addition to fractionating equipment, every manufacturer would be substantially better off if additional storage facilities were available. Some manufacturers are now so equipped that should the prices drop below the cost of production they can, with a minimum expense, stabilize their gasoline to the proper vapor pressure and store to the benefit of themselves and also the industry. This seasonal storage need not be high pressure but merely vapor tight if the natural gasoline is stabilized to approximately atmospheric pressure based on the Reid vapor pressure. At equivalent cost, several times the capacity can be provided in large unit low pressure storage as compared to the type of storage now generally used in the industry. It is a fact, however, that few manufacturers are in this happy position and unfortunately are forced to dispose of their production as rapidly as manufactured. This condition, which might be termed the weakest in the natural gasoline industry, has meant millions of dollars lost to the industry. Especially at times like the present an industry such as ours which fundamentally cannot control its rate of production, cannot expect its customers to furnish the storage during the seasons of low demand and it is expecting the unlikely to assume that the various markets (Mid-Continent, East Coast and export) will so operate as to furnish a steady outlet.

The past year has witnessed the acknowledgement by refiners of the destructive market influence on refinery motor fuels of distressed natural gasoline, resulting in the development of regular statistical information by the W.P.R.A. of natural gasoline production, sales, etc.

A trend or problem approaching at this time is the effect on natural gasoline of the new "motor method" test for octane rating and the mad race for octane number by the refining branch of the petroleum industry. While we have preliminary advice that the octane rating of natural gasoline will be affected less than that of cracked gasoline, considerably more information will be necessary on this subject. The natural gasoline industry should study carefully this new problem to prevent if possible being drawn into this mad race for octane without the most careful consideration of its effect on both this industry and its customers.

Another new factor entering the problem is that of the introduction of lead "Q" for use in regular grade gasoline. If generally adopted by the oil industry several changes are forecast. Less cracking will be performed reducing the production of refinery recovery plant gasoline, which if volatility is maintained should require increased supplies of natural gasoline by refiners. Another factor is the probable increase in endpoints of refinery gasoline, especially should kerosene prices decline, which together with decrease in cracking, some authorities estimate, will increase the yield of gasoline from crude 2 to 5 per cent and should full advantage be taken of the use of lead the volume of gasoline to sold could be increased 5 to 10 per cent. This is a reverse of the recent trend toward increased cracking and reforming with low endpoints which reduced the yield from crude on the higher octane motor fuels.

Well Spacing Proration and Production Practice

(Continued from Page 13)

ration was desired by many because it would maintain prices for crude oil at a constant level would find much of interest in charts shown by Mr. Griswold which prove conclusively that the prices for crude oil have declined consistently since proration has been practiced in the oil fields. Since 1926, with but one exception, the weighted prices of oils for each year show a decline.

Mr. Griswold pointed out that this trend was due to two causes. The tendency of a small minority of operators to find a market for their oil below the posted prices and the development of wells of constantly increasing greater initial capacity. Fewer wells have been completed each year since 1926, but their initial flow capacities have been reported as increasing and this built up an apparently greater surplus of available supply of crude oil.

Under such conditions the law of demand and supply has been operative with decreasing prices. The failure of proration to be enforced 100 per cent has been made evident during this period and has forced lowering of production costs and much smaller gross earnings of the oil companies. There has been an increase in capital investment from about 6 to 14 billions of dollars in this six-year period, but a decrease in earnings during each year. Increased investments have yielded diminishing returns, as expressed by Mr. Griswold, and this trend cannot be continued indefinitely.

In this talk Mr. Griswold made the following recommendations for a more successful proration system:

1. Co-operate with oil operators and the states, through legislative action, to curb excessive additional development until supply and demand are balanced.

2. Discard proration on a potential, or per well basis, and supplant it with a stable and conservative plan, with acreage and sand thickness as the guiding factors.

3. With the discovery of every pool or field, organize a communal gathering pipe line system and make all purchasers take their supply of oil from the communal line and tank farms.

4. Enforce the statutes requiring all purchasers to purchase from a common pool.

5. Ascertain what the prevailing prices are for crude and have each purchaser nominate on what he will pay, and thus control the output of a pool by a price and quantity combination that would benefit everyone. Sell all the oil at a common price.

6. Control waste, especially physical waste, and let it take precedence over market demand nominations.

Because of the conditions pointed out in Mr. Griswold's paper there has been a marked decrease in the number of employes in the oil industry and this subject was treated by the next speaker under the title, "Labor Proration." This paper was prepared by the California drilling practice committee headed by A. C. Rubel, Union Oil Co. of California, Los Angeles, Calif., and the paper was read by E. Jussen, chief petroleum engineer for the same company.

This paper dealt with an important subject in an enlightening manner and described in much detail the methods followed by the California oil companies in allocating work among the workers so that the greatest number of men could be employed the greatest possible time.

Most of the committees made definite plans to follow up their work during the summer and make specific reports at the next meeting of the institute to be held in Chicago during October. Many of these reports will be of great importance and will be looked forward to with much interest, for all signs indicate that by that time definite regulatory measures will be put into operation and some standard forms of procedure will be quite essential to aid in their proper enforcement.

HOPE SERVICE
ENGINEERING--CONSTRUCTION--MANAGEMENT
IN NATURAL GAS
"Unit Responsibility From Well to Meter"
FIELD AND MARKET ANALYSIS
—
ENGINEERING COUNSEL AND DESIGN
HOPE
ORGANIZATION AND FINANCE
—
CONSTRUCTION AND EQUIPMENT
—
MANAGEMENT AND OPERATION
HOPE ENGINEERING COMPANY
MOUNT VERNON, O. NEW YORK, N. Y.

FIELD PROBLEMS FROM READERS

Edited by Thomas F. Smiley

This department is conducted in order that men connected with the drilling, producing or transporting branches of the petroleum industry may obtain aid in solving problems that confront them in their work. Readers are invited to send questions freely. These questions will be placed in the hands of persons capable of answering them authoritatively, and the answers, based on the best available information, will be published.

Each question should give as much detail as possible, especially if it involves depth of sands, types of sands and operations on adjoining or nearby properties. The source of questions will be considered confidential, and only the initials of the sender will be published. Questions involving patented processes, intricate formulas or estimates of cost cannot be answered. If an immediate answer is important, one will be given by mail when the writer requests it.

In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or improved old ones.

If Well Is Cleaning Itself, No Reason Is Seen for Blowing

How often should gas wells be blown when lifting their water nicely into ground drips and automatic drips? Wells are 750 feet deep, with an average of 15 feet of gas sand to each well. The initial rock pressure was 325 pounds and the present rock pressure is 100 pounds. The wells are making 8 to 10 gallons of water per day, tubed with 2-inch tubing.—C. T. J.

The precise information you seek is not wholly clear. If, as you say, the well is cleaning itself "nicely" into ground and automatic drips, it is not apparent why it should be necessary to blow it into the atmosphere at all.

However, if you desire to know what head of water would drown out this gas with a pressure at the well head of 100 pounds, it may be estimated as follows:

Salt water will weigh approximately .443 pound per square inch per foot of height. To build up a pressure of 100 pounds would therefore require a column of salt water 226 feet in height. If the water in your well filled up the hole 250 feet above the face of the sand it is possible that the gas would be cut off.

There are so many details about your gas well, that are not given, it is difficult fully to answer your question, but it is suggested that you obtain a copy of "Natural Gas Handbook," by John C. Diehl in which you will find full information about gas well production and some references to wells in your portion of Kansas.

Good production practice does not consist of blowing the gas to atmosphere, and it is assumed that you have provided syphon and drips. If they are properly designed and installed your well should be cleaning itself of water through that system which will preclude any necessity of blowing the gas to the air.

Opinions Differ as to Best Way to Run Flow Line Into Tank

I am writing to you about a problem that has caused discussion here in the Cut Bank Field. One production man here contends it is easier and better to run the flow line into the side of a 250-bbl. oil tank, near the bottom, and pump against oil in the tank, than it is to run the line up the outside of the tank and pump over the top, which is 8 feet high. He says there is less pressure on a line leading into the side of the tank, with 5 or 6 feet of oil in the tank, than there is if the oil is pumped over the top of the tank. I would like to have an opinion from outside as to which is the better way. This oil is very light.—R. W. N.

This is an interesting little problem and has involved much discussion. There are two phases of it, and these will be treated separately.

The oil in the Cut Bank Field is 38° A.P.I. gravity. This oil has a specific gravity of .8348. The pressure exerted by a column of water 1 foot high is .43 pound approximately. The pressure exerted by a column of Cut Bank oil 1 foot high therefore would be .43×.8348 or .358904 pound. Let us use .356 pound in considering this problem.

In the first proposition the connection is made in the side of the tank about 1 foot 2 inches up from the bottom. Under normal conditions the tank would not be filled to a depth of more than 7 feet 6 inches. The depth of the oil in the tank under these conditions would therefore be 6 feet 4 inches, or 6⅓ feet.

To find the pressure this will exert against the end of the flow line into the tank, we multiply .356 pound by 6⅓ and get 2.25 pounds.

In the second proposition the flow line will run up the side of the tank from the ground and extend at least 1 foot above the top of the tank. This vertical portion of the line would therefore be 9 feet long.

In the line there are three elbows and if 2-inch pipe is used they will place a resistance against the flow of oil equal to an additional 3 feet of pipe. This would make the total lift equal to 9×3 feet or 12 feet.

Multiplying the 12 feet of lift by the weight of the oil per foot of vertical column, or .356 gives 4.27 pounds pressure.

The difference between 4.27 and 2.25 pounds is 2.02 pounds, the saving in head by the use of the side-connection method.

From this basis of consideration it is proven that it will require less power to fill the tank if the flow line is connected in at the side of the tank and though the saving is small it is measurable, and the technical decision must be in favor of the side connection.

However, there are many other things to be considered in making practical decision of this problem. You indicate a desire to have them considered also when you ask which is the proper way to pump oil into the tank and add that this is very light oil.

If the connection is made in the side of the tank near the bottom there will be a larger evaporation loss than there will be if the connections are through the top.

With the lower connection all gas that enters the tank with the oil must pass upward through the oil to escape. In so doing it will become enriched by taking the lighter hydrocarbons into solution and this will reduce the gravity of the tank of oil.

Where there is an appreciable volume of gas this loss can be as much as 2 degrees and may lower the gravity of the 38° Cut Bank oil to 36°. You can check your price schedule to see what such a reduction in gravity will mean in the selling price for the tank of oil.

So if there is a slight gain made in saving of power by connecting into the bottom of the tank it may be lost many times over by the lowering of the gravity of the crude oil in the tank.

The proper way to handle Cut Bank crude oil is to use gas-tight tanks with proper valves and tight thief-holes. The flow line is connected into the top of the tank and a line is run to a point about 18 inches above the bottom of the tank to act as an inside conductor. This conductor is drilled about 6 inches down from the deck of the tank to permit the gas that enters with the oil to escape into the upper part of the tank.

It is doubtful if the pipe line company will accept oil from a lease tank with flow line connected into the side of the tank. With such a connection it is necessary to install a lock stop on each line so that oil cannot be withdrawn through the normal flow line when the tank is on the pipe line connection.

If a tank battery site is properly selected with relation to the wells there is usually enough normal drop between well and tank to deliver the oil into the tanks by gravity flow and under such conditions the difference of 2.02 pounds pressure head is immaterial.

All points considered, the method of connecting into the top of the tank is best but from a strictly technical standpoint a slight saving in power can be made by connecting in near the bottom.

Why Was It Called That?

ADOLESCENT RIVER

The geologist, borrowing a handy word from biology, uses the term "adolescent river" to describe a river in the second stage of a new drainage system, having a well-cut channel that may reach a base-level at its mouth, and a graded bed, and having largely obliterated the lakes and waterfalls of its youthful stage. Its small tributaries may still be in the youthful stage. The word "adolescence" comes from the Latin "adolescere," to grow up to.

Cause of Imperfect Combustion Is Found in Various Conditions

May I ask you to explain what causes imperfect combustion in a Diesel engine? Do the same conditions cause faulty combustion in all types of Diesels or do the causes vary with the different kinds of engines? How may delayed or premature injection of the fuel be detected?—N. O. U.

Imperfect combustion in Diesel engines arises from a variety of conditions, depending upon the type of engine, and it presents an important problem of operation. Either delayed or premature injection of fuel, or a too slow or too fast burning fuel may be detected by the use of an exhaust pyrometer, an instrument for measuring temperatures higher than those recorded by a mercurial thermometer.

Premature injection as well as too rapid burning of the fuel is likely to cause disturbances in the rate of pressure changes during combustion and cause abnormal exhaust gas temperatures. There is usually a detonation of the fuel change at dead center with an excessive rise in pressure.

Late injection as well as slow burning of the fuel causes incomplete combustion and irregular burning of the fuel. The temperature of the flame falls off, causes incomplete combustion, resulting in carbon and other undesirable residue to be formed in the cylinder and deposited in the ports and exhaust passages, contributing to stuck rings and the like. Lower flame temperatures do not mean lower exhaust temperatures. Although lower flame temperatures may be produced in the cylinder, they have a longer duration and cause a dangerously sustained temperature in the cylinder, which is indicated by high exhaust temperature.

High or low spray air pressure will cause the cylinder and piston to become too hot, resulting in an immediate reduction of volumetric efficiency. This means an improper supply of air is being drawn into the cylinder, with the inevitable result that after burning sluggish or poor combustion follows.

Low spray air pressure in the air injection engine results in the injection of the fuel oil being retarded. When the fuel is late and the duration of injection period is prolonged down through the working stroke, it causes a rise in the exhaust temperature, loss of power and smoky exhaust. The operator will then know that it is necessary to correct his injection of timing, or whatever contributed to this condition.

It frequently happens in the case of an unbalanced load that one or more cylinders will show a lower temperature than the other cylinders, indicating that the cylinders of low temperature are getting less than their share of the fuel oil. In this case there is an improper valve adjustment, leaky fuel pipe, leaky fuel line, plugged up fuel lines, water in the fuel, or a stopped up injection nozzle.

Premature ignition of the fuel in a Diesel engine will cause an explosive combustion, resulting in unnecessarily high temperatures as well as dangerously high pressures. The cylinder and the entire engine are subjected to excessive strains and stresses which produce mechanical troubles, even serious breakdowns if not detected and promptly remedied. Such preignition may be due to various causes, usually improper advance in timing of the fuel injection.

TECHNICAL QUESTIONS ANSWERED

By Charles K. Francis, Ph. D., Technical Editor

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible.

Inquiries must be signed but only the given initials will be printed. The source of the questions is considered to be confidential.

Questions requiring a dicussion of patents, the use of intricate formulas, extended computations, or cost estimates cannot be considered.

When the matter is of general interest the reply will be published within a reasonable time.

Compression Ratio and Octane Rating of Gasoline

Some automobile manufacturers specify that high compression gasoline be used in their motors, mentioning the high premium fuels, and others claim that a 70 octane gasoline fills the requirements. Is it true that a 70 octane gasoline is what is called a high compression gasoline? —W. W. G.

The development of power and the satisfactory operation of the automobile engine depends to a large degree upon the compression ratio of the engine and the antiknock rating of the fuel used. The specifications for the 1933 passenger car engines show compression ratios ranging from 4.8 to 1 as the low and 6.5 to 1 for the high; the largest number of the cars operating on close to 5.5 to 1. The expression "high compression ratio" is a relative term, being used in comparison to the compression ratios of about 4.5 to 1, which were common a few years ago. The highest reported to be in use at this time is 12 to 1, in special engines, used in racing cars.

Ever since the discovery of the fact that the maximum practical compression ratio depended upon the quality of the fuel, efforts have been made to improve the gasoline to meet this requirement. The straightrun gasolines obtained by topping the various crude oils, will probably show an antiknock value of around 50 octane number and the cracking process will, under some conditions, yield gasoline testing as high as 90 octane number. By proper blending of the straightrun and the cracked product a motor fuel of 70 to 72 octane number is obtained.

The knocking tendency of a gasoline is now widely recognized as an important property. The trade has for several years adopted 57 octane number as the basis for grading antiknock gasolines, since the market quotations show a premium for the material testing 57 to 65 octane number and an additional premium is paid for 65 octane and above. Effective May 6, 1933, a new grading system was established by Mid-Continent refiners. U. S. Motor gasoline was priced according to three octane ratings. These were:

1. 59 and below.
2. 60 to 64.
3. 65 and above.

It is agreed that the C.F.R. Motor Method of testing shall be used when determining octane number and a tolerance of one-half octane number shall be observed when grading. For example, a 59.5 octane number determination will place the gasoline in the 59 and below class, but 59.6 will put it in the 60 to 64 class.

The gasolines showing the lower ratings of straightrun are not suitable for the 1933 engine. The old cars, and those having the lowest compression ratios, may use the product of about 50 octane number, now sold as a third grade, but quiet running and the development of the maximum power in the modern engine requires the better grade. Gasoline having a knock rating of 70 to 72 octane number is reported to operate the newer cars satisfactorily.

It has been possible for the refiner to install the improved forms of cracking equipment adapted for making high octane gasoline, so that the quality of the motor fuel has been raised more rapidly than it has been possible, or advisable, for the designer of the automobile engine to increase its power and efficiency. The progress made by the refiner has resulted in making some gasoline of higher antiknock rating than the majority of the cars in service require.

Sulphur and Hydrocarbons Make Treating Difficult

Do you have any explanation of the tendency for sulphur, derived from hydrogen sulphide, to combine with hydrocarbons in such a way to make reduction of sulphur difficult by ordinary treating?—R. O. N.

It is well known that free sulphur is formed during the refining of some petroleums and that under favorable conditions this sulphur will again enter into combination. Certain of the heavier sulphur compounds, such as the thiophenes and their derivatives, do not respond to mild treatment; so if these are present in a distillate it is necessary to use additional acid or other strong chemicals to remove this form of sulphur.

The combination of sulphur with various hydrocarbons is discussed by Dr. W. Friedman, Erdol und Teer, 6, 342 and 359, 1930. This was translated by Dr. W. F. Faragher, as published in The Oil and Gas Journal, December 18, 1930, page 32, from which the following quotation is made.

How incorrect is the opinion, long held, that the paraffin hydrocarbons are inert toward sulphur is proved by the vigorous reaction that takes place between petrolatum or solid paraffin and sulphur upon heating. The reaction can be used as a convenient method of preparing hydrogen sulphide. The liquid homologs behave similarly if they are heated under pressure above their boiling points. Large quantities of hydrogen sulphide are split off and even at temperatures between 250° and 300° C. (482° and 572° F.) the reaction proceeds so far that pronounced coking of the hydrocarbons takes place. The assumption that paraffin hydrocarbons are converted into olefins by sulphur at temperatures below the cracking range is supported more by tradition than by fact. If cracking temperatures are avoided, this assumption is incorrect. Among the reaction products other than gases, n-pentane, n-hexane and n-octane, no unsaturated hydrocarbons were found under the conditions of experiment nor were the mercaptans corresponding to the starting materials detected. The products of the reaction have an unbearable odor which arises principally from the lower mercaptans dissolved in them and in the gas. By the use of active carbon, methyl mercaptan could be adsorbed from the gas, but on account of complaints from all sides the more thorough investigation of the volatile sulphur compounds was abandoned. The appearance of methyl mercaptan is understandable from the extensive decomposition of the molecule which results in marked coking (up to 20 per cent of the original substance). The designation "coke" requires, however, an explanation, an intimate mixture of carbon and sulphur is produced, from which the sulphur can be extracted only in part by solvents. If the residue after such an extraction is heated to 300° C. some sulphur is liberated but the main portion is not extractable in this way.

This observation is supported more or less by that made by Claus on "thiophene-graphite," which he described as solid carbon sulphide and which behaves similarly to the compounds of carbon and sulphur obtained by Wibaut. Whether or not the existence of these solid carbon sulphides is admitted, it is certain that paraffin hydrocarbons produce decomposition products distinct from those yielded by the olefins and naphthenes, which form asphalt, as we shall see later.

Average Consumption Gasoline and Lubricating Oil

Could you give the figures showing the yearly consumption of gasoline and lubricating oil by automobiles? If available, mileage and car basis figures would be appreciated. —A. L. D.

The latest data, for the year 1932, show the following registrations.

Cars	21,173,698
Trucks	3,131,269
Buses	69,012
Total	24,373,979

The American Petroleum Institute has estimated the passenger car operation at 150,000,000,000 vehicle-miles, with a total motor fuel consumption of 15,000,000,000 gallons and 450,000,000 gallons of lubricating oil. This is equivalent to 10 miles per gallon of motor fuel and about 334 miles per gallon of lubricating oil.

Each vehicle required approximately 600 gallons of gasoline and 14 gallons of lubricating oil. The consumption of lubricating oil is equivalent to 2.34 per cent of the gasoline, or motor fuel.

The American Petroleum Institute reports 24,000,000,000 ton-miles truck operation and 11,000,000,000 passenger-miles bus operation during the year.

Creosote Oil Used as Substitute for Gasoline

Any information you may have relating to the utilization of creosote oil for motor fuel will be appreciated.—H. G. F.

The Belfast Omnibus Co., Belfast, Ireland, operates a fleet of buses with creosote motor fuel. They report a considerable saving over the local cost for gasoline.

The properties of this product are shown in the table:

A.P.I. gravity	21.5°/19.8°
Specific gravity	0.925/0.935
Closed flashpoint (P.M.)	95/100°F.
Carbon residue (max.)	0.03%
Ash	0.01%
Distillation:	
Initial	320°F.
At 392° F.	50–60%
At 464° F., (min.)	95%
Tar acids, (max.)	10%
Water	Nil
Suspended matter	Nil

The fraction of creosote required to produce this fuel is that distilling between 18.3°/13.6° A.P.I., washed with a 13° Be. caustic soda solution to reduce tar acid content to not more than 10 per cent. The washed creosote is then mixed with 10 per cent benzol, the latter holding the naphthalene liquid. Owing to the high flashpoint of this fuel, the engine must be started from cold on gasoline, and, after a few seconds to warm up, changed over to the creosote fuel. This requires two carburetors and an extra fuel tank. The further modification of the engine is made to include arrangement of the exhaust manifold for preheating the fuel.

Weight and Volume Equivalents for Crude Petroleum

Is there a standard figure representing the weight of a gallon, or barrel of crude oil for the purpose of estimating various equivalents in volume, such as cubic feet and the metric system? How many barrels are equivalent to a ton? Does this vary in different countries?—E. B. R.

There is no uniform method for indicating the volumes and weights of petroleum in the several countries that produce oil. The nearest approach to an agreement is the metric ton of 2204.6 pounds, or 1000 kilograms, and 7.5 barrels to the long ton. The following are commonly used in the United States.

ONE BARREL EQUIVALENTS

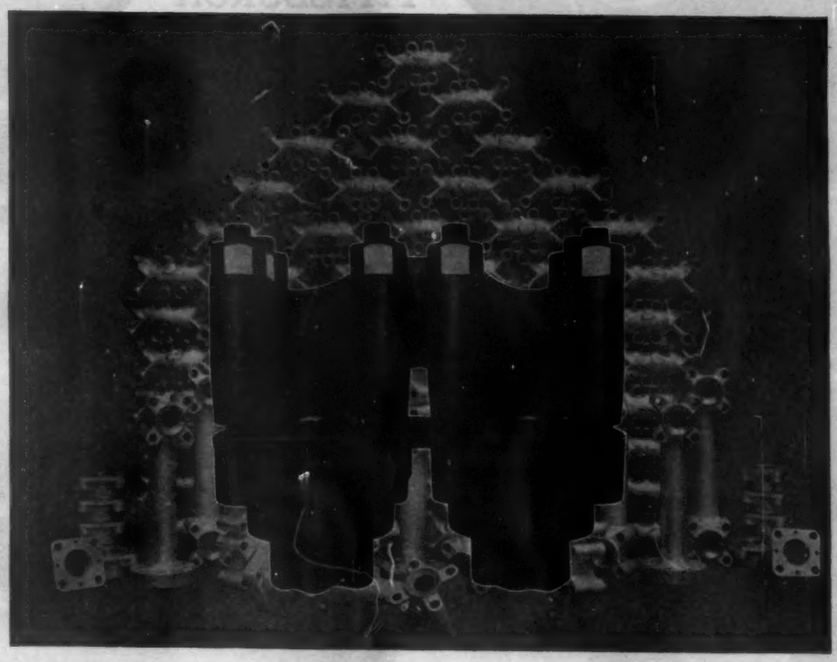
U. S. Units	
Gallons	42
Cubic Inches	9702
Cubic feet	5.6146
Pounds (Avoir.)	350.122
Kilograms	158.8397
Metric tons	0.1588397

The weight equivalents in this table are based on water, A.P.I. gravity 10 and specific gravity 1; if exact figures for oil are required it is necessary to know the specific gravity of the oil in question, and from the standard weight of a gallon of water, 8.34 pounds, the equivalents may be calculated.

The figures commonly used in the United States for petroleum computations are derived from an oil of 36° A.P.I., or 0.8448 specific gravity. This oil weighs 7.038 lbs. per U.S. gallon of 231 cubic inches and 295.596 lbs. per barrel.

A number of the oil producing countries have adopted the metric system of weights and measures, the large unit being the metric ton. The equivalents in U.S. barrels range from 7.1 to 7.5 barrels per ton, in these countries by legal definition.

At last! dependable still tube header connections for high pressures and temperatures



AGAIN, an important contribution to efficiency and safety in oil refineries has been made by Crane engineers—the new Crane Stream Line Return Bend Assembly for Oil Stills. Now, with this patented development, refiners can use high pressures and temperatures with a still tube header connection that is dependable.

The metal to metal joint, carrying the full strength of the metal itself without danger of slipping off the tubes, operates safely under pressures up to 3000 pounds and temperatures of 1050 to 1100 degrees Fahrenheit. When made of Crane 4-6% Chrome Molybdenum steel it is highly corrosion resistant. Stream lining reduces resistance to flow and facilitates cleaning. The assembly is easily and inexpensively made with calibrated tools.

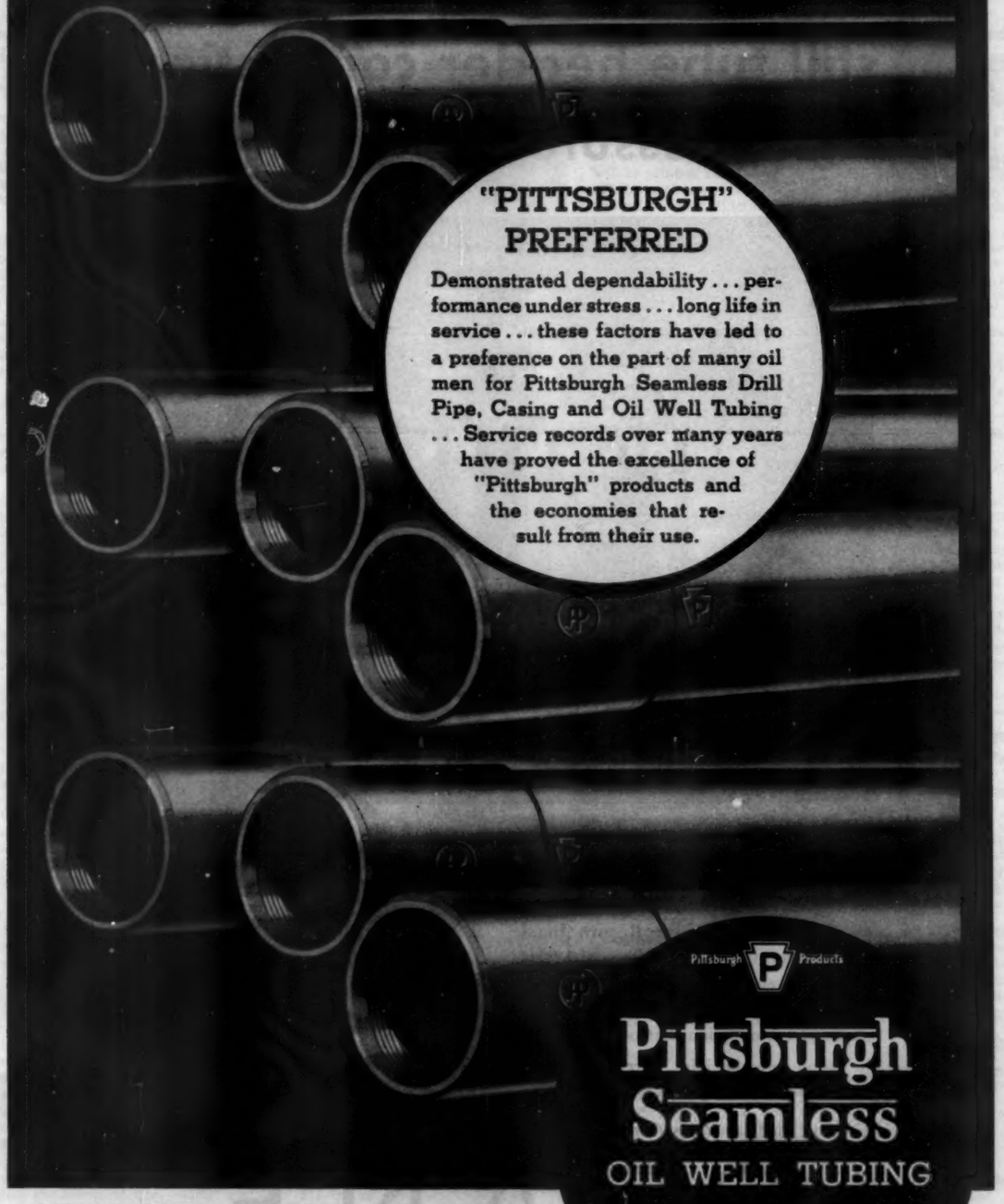
You are invited to write for information.

• Visit the Crane Industrial Exhibit in the Electrical Building at A Century of Progress

CRANE

CRANE CO., GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO
NEW YORK: 23 WEST 44TH STREET
Branches and Sales Offices in One Hundred and Sixty Cities

FOR ITS RECORD PERFORMANCE:



"PITTSBURGH" PREFERRED

Demonstrated dependability . . . performance under stress . . . long life in service . . . these factors have led to a preference on the part of many oil men for Pittsburgh Seamless Drill Pipe, Casing and Oil Well Tubing . . . Service records over many years have proved the excellence of "Pittsburgh" products and the economies that result from their use.

Pittsburgh P Products

Pittsburgh Seamless

OIL WELL TUBING

DRILL PIPE

CASING

PITTSBURGH STEEL COMPANY

Seamless Tube Division, Pittsburgh, Pa.

NEW YORK CHICAGO DETROIT ST. LOUIS

HOUSTON TULSA LOS ANGELES

NATURAL GAS DEVELOPMENTS

Market for Midland Gas Opened by Bay City Vote

MOUNT PLEASANT, Mich., May 22. At last it looks as if the gas well owners in the Central Michigan Field are to find a market to a larger extent than at any time since the oil and gas fields were opened. The latest report is that the Consumers Power Co. was voted a natural gas franchise by the Bay City Commission a few days ago by a 6 to 3 vote, the commission authorizing the utility to proceed with plans for the distribution of natural gas in Bay City according to the contract approved by the former commission. Under the terms of the franchise the company is to start immediately supplying Bay City with mixed artificial and natural gas and to switch to natural gas as soon as necessary equipment and lines can be constructed.

Prior to April 1 the old five-man commission of Bay City had approved a franchise for the Consumers Power Co. which was accepted by the company. However, the mayor refused to affix his signature and later when the new nine-man commission was voted into office it voted to nullify the contract. The subsequent action came as a surprise, but it is generally believed the company will accept the commission's action and start at once to prepare the city with natural gas. The gas supply will be drawn from the Broomfield Pool, the most prolific pool yet developed in Michigan and having the greatestt acreage and reserves. The Consumers company now has a line from the pool to Midland, a comparatively new line. Probably a new line will be built from Midland to Bay City.

Bay City's action is expected to refocus attention on natural gas by the commission of Saginaw, which has had for months a similar proposal before it from the Consumers company.

Mount Pleasant and Midland are the largest cities thus far to utilize natural gas from the Central Michigan Field. Bay City has a population of more than 47,000 and is expected to provide a daily market for well above 1,000,000 feet. This has the potentialities of being greatly increased in the event industrial markets are built up.

Opening up of the Bay City market will come as cheering news to developers and royalty owners in the Broomfield Pool, west of Mount Pleasant, in particular. It will result in greatly increasing the pull of gas from the wells, now less than 500,000 feet a day, and probably spur new development.

The Bay City action also is likely to bring a decision from the Michigan Natural Gas Co. as to whether it will go ahead with a line from the Central Michigan Field to Bay City and Saginaw as given permission by the State Public Utilities Commission late in 1932. Under the permit granted the company, construction must be started by June.

Saginaw and Bay City councilmen with Clare officials and the gas field operators made a tour of the Clare County gas fields recently. The visit was sponsored by the Gas Association of Clare.

James M. Taggart and others' test on the James H. Barton farm, NW SW SW Section 11, Austin Township, Mecosta County, that showed a gas volume of 4,120,000 feet in the Michigan Serices formation, was drilled to the Dundee in hope of striking oil, but hit water and the hole will be plugged below the gas sand. This was a very important test and indicates gas can be found where least expected. Other tests will be made by this company.

Gas Contract Committee Reports Work Completed and Now in Progress

By T. R. GOEBEL
Skelly Oil Co.*

In our report of the activities of the gas contract committee for last year we mentioned the recommendation we had made to the board of directors of this association that they approve the revised schedule of gas payments which was more fully reported upon at that time. It is with genuine gratification we can report this year that the association did adopt this schedule of gas payments and moreover that it has already been incorporated in a new edition of the standard form of casinghead gas contract. Another distinct improvement in and addition to our contract is the inclusion, in its latest edition, of a table of readings interpreting the residue gas curve of our contract. This was the work of a special subcommittee of the gas testing committee and is mentioned here because it is such a noteworthy supplement to our contract eliminating, as it does, much misunderstanding of just how much residue is due the seller under any given set of conditions.

The activities of this committee in the last year may well be said to have been largely devoted to the education of representatives of Federal and state regulatory, supervisory and legislative bodies, with respect to the true meaning and definition of the market value of casinghead gas especially as such market value is affected by state gross production tax and by state and Federal royalty interests in gas.

Under date of January 29, 1932, the Department of the Interior announced the substitution of the old departmental schedule of rates fashioned largely after the schedule of prices included in our 1930 N.G.A. standard form of contract. The department's new schedule provides for 20 per cent of the gasoline on gas up to one-half gallon per 1,000 feet, 25 per cent up to 1½ gallons per 1,000 feet but more than one-half gallon per thousand, and 33⅓ per cent on all gas above 1½ gallons per thousand. It will be recalled our original schedule allowed 20 per cent of the gasoline on gas up to three-quarters gallon per 1,000 feet, 25 per cent from there to 1¾ gallons per thousand and 33⅓ per cent above 1¾.

We arranged to promptly protest the department's interpretation, or as we preferred to more correctly call it, substitution, of the old departmental schedule, Figure 1 of the regulations, pointing out that, without hearing, and contrary to the express provisions of the regulations themselves, they had altered the method of computing royalty, had changed the basis of such computation and had in fact raised the royalty. The whole matter has now been briefed and is being handled by a joint legal and technical committee of the Mid-Continent Oil and Gas Association and it is the personnel of the gas contract committee of the Natural Gasoline Association that is acting as technical advisers to the general committee. A formal hearing may be had on this in Washington before long, at the same time certain other questions such as gas measurement and residue gas volume determinations, both very important points, will be argued before the department.

The state taxing authorities have also tended to engage our attention, particularly with respect to their ideas of the value, for tax purposes, of residue gas sold to dry gas pipe lines, residue gas consumed on leases or in gasoline plants, as well as the taxable value of casinghead gas. In this particular we have indulged in considerable educational work in an endeavor to clearly and properly state the market value of casinghead gas, which after all, is its true taxable value under the law. Much more could be said on this subject but possibly it had best await further developments.

Every legislature has submitted to it bills affecting gas too numerous to mention. The committees considering these various bills generally have open minds on the subject and need most of all to be informed as to the facts in the case. Having spent some time on this phase of governmental relationship I cannot too strongly urge that this association devote more attention to this very important problem as it affects us in respect to both Federal and state governments. Might I be bold enough to suggest that future contract committees be enlarged in membership and scope, and possibly in name too, to include an active interest and participation in tax matters, as they affect gas. It was chiefly, if not entirely, due to aggressive and intelligent observation and contact at our most recent legislature that a positively confiscatory tax bill on gas was not passed.

*Report presented before convention of Natural Gasoline Association of America in Tulsa, May 15-17.

O. N. G. MOVES DIVISION

As a result of a consolidation of the district field operations by the Oklahoma Natural Gas Co. 15 families of employes will be moved from Morris to Okmulgee, Okla. The field operations division which has maintained headquarters in Morris, will operate out of Okmulgee office, according to W. M. Maher, district manager.

E. H. Newkirk, superintendent, will be in charge of operations. The company's warehouse at Morris will be closed and material moved to Okmulgee. Maher and Newkirk will supervise 364 miles of trunk pipe line. The Okmulgee district extends north of Okmulgee to Kiefer, east beyond Redbird, south to McAlester and the Quinton gas field and west to the end of the company's lines. The cities of Okmulgee, Morris, Checotah, Eufaula, Weleetka and Preston are included.

COLUMBIA INCOME

Columbia Gas & Electric Corp. had a net income of $16,190,278 for 12 months ending March 31, 1933, compared with a net income of $19,872,901 for the 12 months ending March 31, 1932. The earnings are equivalent to 86 cents a share for the 11,608,595 shares outstanding, against $1.21 a share for the 11,609,995 shares outstanding in 1932. Net income for the quarter ended March 31 was $5,466,673, equal after preferred dividends to 33 cents a common share. This compared with $6,481,070 or 43 cents a common share in the first quarter of 1932.

SASKATCHEWAN GAS PROJECT

CHATHAM, Ontario, May 20.—Fabyan Utility Syndicate has been organized to promote a project for marketing natural gas from the Kinsella, Wainwright and Fabyan Fields of Alberta to Regina and other Saskatchewan cities.

Plan of Readjustment for Oklahoma Natural

An announcement of wide interest to Oklahomans is made by a protective committee for preferred stock of the Oklahoma Natural Gas Corp. The committee has prepared a plan of readjustment of the capital structure of the company which is now being submitted to all preferred stockholders for their approval. The purpose of the plan, according to the committee, is to meet present economic and financial conditions. The approval of the holders of the current notes of the company and of the common stockholders, after several months of negotiations, has been obtained by the committee, which is composed of A. E. Bradshaw, executive vice president of the First National Bank & Trust Co., Tulsa; Benjamin C. Conner of Conner and Winters, attorneys, Tulsa; James C. Denton, vice president and general counsel of the Mid-Continent Petroleum Corp., Tulsa; Lloyd S. Gilmour of Blyth & Co., New York, and George T. Purves of Graham, Parsons & Co., New York, chairman.

Holders of $4,277,172.26 direct obligations of the company have agreed, according to the offering which is being sent to preferred stockholders to surrender these obligations for an issue of $4,200,000 of 10-year 6 per cent second mortgage bonds. Holders of second preference stock aggregating approximately $3,132,800 have agreed to surrender this stock to the company for cancellation. The holders of 99 per cent of the common stock have agreed to give approximately 20 per cent of the common stock to the preferred stockholders, all on condition that the preferred stockholders approve the plan. The first mortgage bonds are to remain undisturbed.

The holders of the 6½ per cent cumulative preferred stock are given an opportunity to exchange their present holdings, and for each share are to receive one new share of preferred stock and one share of common stock; while each share of 7 per cent cumulative preferred stock would receive one share of new preferred stock and 1 1/10 shares of common stock. The new preferred stock is to have a par value of $50 a share; preferential dividends of $5 per share per annum, cumulative from January 1, 1939; and redeemable at $50 plus any accrued dividends.

"Although holders of preferred stock reduce the rate of preferred dividends now called for by their stock," says the letter, "they receive a new preferred stock on which it is reasonable to anticipate payment of dividends under more normal conditions and, in addition, a share of the common stock which offers them an opportunity to benefit in the future prosperity of the company."

The committee, in the letter, urges prompt action on the part of the stockholders, expressing the belief that the plan is constructive and will best protect the interests of the preferred stockholders under existing conditions. The Oklahoma depositary for preferred stock is the First National Bank & Trust Co. of Tulsa. The shares also will be received at the various Oklahoma Natural offices for transmissal to the depositary.

CALIFORNIA CONSUMERS LEAD

At the end of 1932 there were approximately 5,500,000 natural gas customers in the United States, of which approximately 5,030,000 were domestic. California had approximately 1,345,000, of which 1,292,000 were domestic—a greater number than any other state.

PERSONAL PARAGRAPHS

Frank E. Cox, comptroller of the Cia. Nacional de Petroleos, of Argentina, is visiting the New York market.

• • •

J. C. Taylor, sales manager for the Ethyl Gasoline Corporation, with headquarters in New York, has returned from Tulsa.

• • •

Col. Walter Pyron, vice president of the Western Gulf Oil Company, has returned to California after making a hasty trip by plane to Texas.

• • •

James Peat, former oil operator and drilling contractor of Petrolia, Canada, now in his ninety-first year, is recovering from a recent illness.

• • •

F. R. Nicholson, superintendent of Wink district, Continental Oil Company, is spending his vacation visiting points in Oklahoma and Arkansas.

• • •

P. R. Johnson, president of the David C. Reid Company, Inc., New York oil and shipping brokers, is on a business trip to southern markets.

• • •

Dart Hoffman, of the lubricating oil sales department of Tide Water Oil Company, New York, was visiting Chicago on business last week.

• • •

Richard Airey, president of the Asiatic Petroleum Company, has sailed for England, for a visit at the headquarters offices of the Royal Dutch-Shell group in London.

• • •

Arthur O. Wall, marine superintendent of the General Petroleum Corporation, has been elected a director of the Bilge Club, a marine organization at Los Angeles Harbor.

• • •

R. R. Kirchner, independent oil operator of Bristow, Oklahoma, is displaying golf tournament trophies that he helped win at the district Rotary club meeting at Wichita, Kans.

• • •

A. A. Weaver of Oil City, Pa., has sailed from New York for Port Jerome, France, where he has been sent on business by the National Transit Pump & Machine Company.

• • •

Samuel Marx, formerly associated with G. Mathes & Company, of St. Louis, Mo., has been made vice president in charge of sales of the American Sanitary Rag Company, and will make his headquarters in Chicago.

• • •

William Groundwater, superintendent of transportation of the Union Oil Company of California, left Los Angeles for San Francisco and the Pacific Northwest by plane on a tour of inspection of the company's marine facilities.

• • •

George Schneider, geologist with The Texas Company at Shreveport, La., and president of the Shreveport Geological Society, and Miss Katherine Watson, daughter of Mr. and Mrs. Frank Watson, of Tulsa, were married May 15 at the home of the bride's parents.

• • •

J. B. Aug. Kessler, joint managing director of the Royal Dutch-Shell group, has been made an officer of the Legion of Honor. M. Branet, chairman of Societe Anonymes des Petroles Jupiter, on special authorization of the French Ministry of Foreign Affairs, conferred the decoration.

• • •

F. E. Lacaze, district manager for the United Gas Public Service Company, at Shreveport, La., and Mrs. Geraldine McWilliams, widow of the late D. R. McWilliams for many years connected with the United and The Palmer Corporation, its predecessor in North Louisiana-Arkansas territory, were married in Shreveport, May 15, and are spending their honeymoon in Gulf Coast resort cities.

Kenneth Porter, assistant treasurer of the Sinclair Refining Company, has sailed from New York for England.

• • •

H. G. Brandli, vice president of the Cities Service Export Oil Company, New York, has returned from an extended business trip to Europe.

• • •

J. L. Nichols, superintendent Longview and Kilgore district, Stanolind Oil and Gas Company, has been transferred to Wink, Texas and Jal, New Mexico area, with district offices at Wink.

• • •

Jack Levering, who has been scouting the Oklahoma City district for the Stanolind Crude Oil Purchasing Company, is being transferred to the East Texas Field, and Barney Terrell is now located in the Oklahoma City Field.

• • •

Marguery Rollins, private secretary to J. Paul Getty, has been elected a director of George F. Getty, Inc., George F. Getty Gasoline Company, Sandoma Gasoline Company, George F. Getty Petroleum Company and Loyal Petroleum Company.

Men of the Industry

AXTELL J. BYLES

Axtell J. Byles, elected president of the American Petroleum Institute at its recent mid-year meeting in Tulsa, and the eighth to take office as chief executive of the petroleum industry's largest trade association, was born October 21, 1880, in Titusville, Pa., a son of Julius and Mary Axtell Byles. He graduated from the Titusville high school in 1898; attended Lawrenceville School (New Jersey) 1898-99; received the degree Bachelor of Science at Princeton in 1903; read law in Pittsburgh and was admitted to the bar there in 1905.

Upon his election as president of the Institute he resigned as president of the Tide Water Associated Oil Company and Tide Water Oil Company and as chairman of the board of directors of the Associated Oil Company.

Mr. Byles is a member of the Pennsylvania Society of New York and of the Adirondack League, Princeton, Whitehall, Metropolitan, Ardsley, The Racquet and Swimming, and Manursing Island clubs. His home is at Ardsley-on-Hudson, N. Y. He married Florence Payne, of Titusville, in September 1905, and has two sons, Julius and Axtell Byles.

Joseph McCarthy of Eastern States Petroleum Company, New York, has been confined to his home with an attack of arthritis.

• • •

Dick Brooks of the General Petroleum Corporation presided at the monthly meeting of the Los Angeles Petroleum Accountants Society.

• • •

F. G. Rappaport, general manager of the Venezuela operations of British Controlled Oilfields, Ltd., is visiting oil fields in the United States.

• • •

R. A. Broomfield, J. J. Doyle and Rush M. Blodget were recently elected vice presidents of the Oil Producers Sales Agency of California.

• • •

Isaac Harter, vice president of the Babcock & Wilcox Company, accompanied by Mrs. Harter and their son, have sailed from New York for Europe.

• • •

Jan J. Roos, of the Diadema Petroleum Company, Argentina subsidiary of the Royal Dutch-Shell group, arrived at New York last week from Buenos Aires.

• • •

M. Kapeluchnikof, Russian inventor of drilling apparatus and a cracking process, has been appointed head of the Soviet Institute of Petroleum Research.

• • •

H. G. Morris, of Hargal Oils, Ltd., has returned to Vancouver, British Columbia, after inspecting the company's properties in the Turner Valley and Wainwright Fields of Alberta.

• • •

J. W. Mitchell, superintendent of the Kansas City, Kans., refinery of Phillips Petroleum Company, has been appointed a colonel on the staff of Governor Alf M. Landon of Kansas.

• • •

J. A. Jameson, C.B.E., head of the production department of the Anglo-Persian Oil Company, is making one of his periodic visits of inspection to Persia. He is accompanied by T. MacDonald.

• • •

J. R. Bahan, of Bahan & Bahan, of Shreveport, La., and representative in North Louisiana-Arkansas territory for Ralph E. Davis, engineers, of New York, has joined the United Gas Public Service Company, which he will represent in the East Texas Field.

• • •

J. H. Yoho, formerly district superintendent of Wink district, Sinclair-Prairie Oil Company, has been transferred to Howard County and Ranger district. He was succeeded by L. Surrett, who came from the Longview-Kilgore district to take over the Wink district.

• • •

R. G. Stewart, E. A. Holbein, J. R. Riddell, R. N. Keppal, A. C. Minton, J. A. Donan, A. S. Pawling, E. S. Hall, John E. Skehan, A. C. Bedford, and Dr. R. T. Haslam, all of the New York offices of Standard Oil Company of New Jersey, are visiting division sales offices of the company and its subsidiaries.

• • •

Bert Allen, Tulsa, who has been in charge of the Kansas-Oklahoma and Texas Division, with the exception of East Texas, for the Snowden-McSweeney Company, has also been placed in charge of production over the latter district. He probably will move his headquarters from Tulsa to Fort Worth within the next two or three months.

• • •

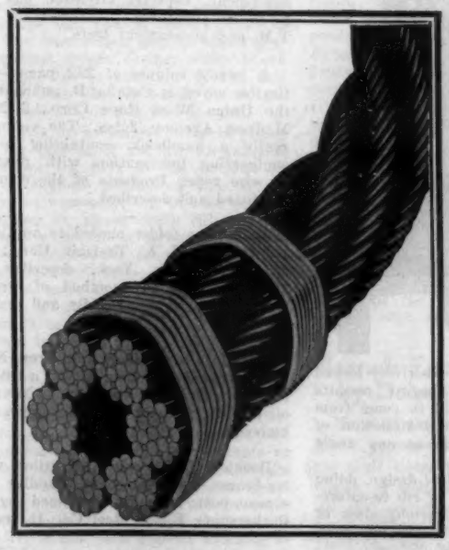
Fred W. Cordell has been named the new division manager of Phillips Petroleum Company for the Oklahoma and western Arkansas division at Tulsa, after serving as division manager in Peoria, Ill., Springfield, Kansas City and St. Louis for more than two years. He entered the oil business with the Waite Phillips company, and joined the Phillips Petroleum Company in 1928.

. . . but discontentment does not lower rope costs

When all the problems of commercialism are removed and financial stability is assured, satisfaction with existing conditions is justified and delightful.

But . . . progress is born of discontent.

Rope users, discontent with rope costs, brought pressure on rope manufacturers. Wickwire Spencer, always dissatisfied unless the customer is content, has gone the known limits in improving their product in order to give all users a better rope. Use Wickwire Spencer Wire Rope, keep accurate costs and performance records, and see what past "satisfaction" has cost you.



ALSO WISSCOLAY PRE-FORMED ROPE

Wickwire Spencer manufactures all sizes and types of wire in PRE-FORMED as well as in standard lays. WISSCOLAY is the name given to Wickwire Spencer Pre-formed Wire Rope. It has Wickwire Spencer Quality.

WIRE ROPE

by Wickwire Spencer

Send for this free Wire Rope book. It will prove of great value.

Wickwire Spencer Steel Company, 41 East 42nd Street, New York City

Branch offices and warehouses: Buffalo, Chicago, Worcester, Tulsa, San Francisco (Pacific Coast Headquarters), Los Angeles, Portland, Seattle. Export Sales Dept., New York City

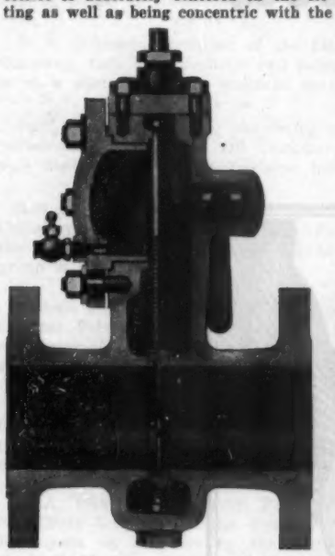
NEW AND IMPROVED EQUIPMENT

Lucas Orifice Fitting Has Design Features of Value

The Southwest Welding & Manufacturing Co., Alhambra, Calif., has introduced the Lucas orifice fitting, which, because of its compactness, light weight and sturdy construction, is said to adapt itself to any installation regardless of space limitations.

The necessity of head room for an elevator screw or for disc removal has been eliminated. With it is eliminated also the likelihood of damage occurring when the orifice plate is removed at the top of a fitting. The elevator stem no longer screws out of the top plate, but remains in position similar to a nonrising stem gate valve.

The fitting is so constructed that the orifice is absolutely centered in the fitting as well as being concentric with the



axis of the pipe, and is positively locked during operation. This feature permits the flow of gas or liquid to come from either direction, and the installation of the fitting may be made at any angle desired.

The fitting is of elliptical design, doing away with the necessity of rib re-enforcing and lightening the various sizes of orifice fittings from 10 to 40 per cent, depending upon the model.

The simplicity and compactness of disc removal mechanism and chamber removes all hasard from plate changing. The throwing of a single lever brings a globe type valve disc directly against the plate carrier, in turn sealing it against the machined seat of the body. Line pressure holds the valve closed.

The positive stops which control the location of the disc holder in its top and bottom position are turned at the same time the fitting is bored, assuring precise centering. The disc holder is bored while in line position, to insure perfect alignment and internal bore smoothness. Pressure taps are exactly 1-inch from center of orifice disc, and are of adequate size to prevent stoppage. A drain tap is provided on each side of the sediment pocket, permitting cleaning straight through or draining from either side. All other operations take place well above the top of the pipe.

"The Maintenance of Reciprocating Parts" is among interesting articles in the March number of Oxy-Acetylene Tips, published by the Linde Air Products Co., 205 East Forty-second Street, New York.

Notes About Trade Literature

The Simmons Automatic Valve Co., Longview, Tex., is sending to those who ask for it a bulletin giving information about the Simmons automatic flowing valve for lifting and flowing oil and other fluids from producing oil wells.

—

The Taylor Forge & Pipe Works, Chicago, is sending to those who ask for it a paper, accompanied by diagrams, delivered by F. S. G. Williams before the New York section of the American Welding Society, entitled "Design Your Welded Piping."

—

A new series of oil field valves, expressly designed, built and tested for 5,000 pounds pressure per square inch, is the subject of an eight-page bulletin which the Kerotest Manufacturing Co., Pittsburgh, Pa., has ready for distribution.

—

The American Instrument Co., Washington, D. C., announces a catalog of petroleum laboratory instruments and equipment. Especial attention has been given to apparatus prescribed for A.S.T.M. and government tests.

—

A handy volume of 232 pages, with flexible cover, is Catalog B, published by the Union Wire Rope Corp., 3 North Madison Avenue, Tulsa. The volume is really a handbook, containing helpful engineering information with reference to wire rope. Products of the company are listed and described.

—

A six-page folder mailed to applicants by the Metal & Thermit Corp., 120 Broadway, New York, describes the Murex straight-gap method of welding heavy plates easily, rapidly and economically.

—

The McLeod & Henry Co., Troy, N. Y., has prepared for distribution a 16-page booklet describing its "Steel Mixture" oil brand fire brick and other refractory materials.

—

Booklet C-3-33, which describes walking-beams, walking-beam saddles and samson-post bearings is issued by the Parkersburg Rig & Reel Co. It may be obtained at any of the company's branch warehouses, district offices or by writing the home office in Parkersburg, W. Va.

—

A. M. Byers Co., Pittsburgh, Pa., issues a very interesting booklet entitled "The New Story of Ancient Wrought Iron." It answers the often asked question, "How do you make wrought iron?" The text is not too technical and the illustrations are actual scenes. The booklet may be had free upon application.

—

The Allen Corp. announces in a bulletin recently issued what the company describes as a sensational new product, the Allen electro-wind turbine ventilator. The company claims 20 exclusive features for this new ventilator. The dual purpose exhauster is designed to handle unusual air-removal problems which require a large exhaust only a portion of the time or under certain extraordinary conditions. When such conditions arise the touch of a switch or the operation of an automatic thermostat control increases the exhaust from 100 to 200 per cent.

—

The Bridgeport Bulletin for May, published by the Bridgeport Machine Co., Wichita, Kans., combines news of a visit of Mid-Continent purchasing agents to the company's plant and late developments in the company's products which include pumping hangers, stuffing boxes, casing shoes, drill pipe floats, rotary reamers, underreamers and other tools. The subject of drilling muds comes in for considerable space and the advantages of Aquagel and Baroid are set forth.

—

The Reading "Puddle Ball" for May published by the Reading Iron Co., Philadelphia, features a short illustrated story on "The Land Without a History," treating of a vast and little known part of Africa. The story relates how certain savage tribes in Africa have been skilled smelters of iron since time immemorial and of the various uses they make of the fabricated metal. The booklet also illustrates the long life of puddled iron in storiettes of its use in well-known old American churches, hotels and public buildings.

Quick Service to Conroe Field Is Recorded by OCT

The picture shows the Oil Center Tool Co.'s hurry-up service to its new Conroe, Tex., store from the Houston plant. This truck delivered to the Conroe store in one hour four assembled and tested christmas trees, all of which had been sold before delivery was made. This same type of service is given on delivery of OCT equipment within 250 miles of Houston in emergencies.

New Portable Compressor Offers Marked Economies

The Ingersoll-Rand Co., 11 Broadway, New York, has developed a new portable air compressor which adapts the advantages of two-stage stationary compressors and makes them usable in portable units. Improvements give the new compressor marked economies and efficiencies never before attained in portable machines. Tests are said to show that, size for size, the new compressor will deliver 23 per cent more compressed air than previous models.

The compressor in the new machine is a two-stage, air-cooled unit. It has two low-pressure cylinders, arranged in a V, and between them, in vertical position, a high-pressure cylinder. The efficiency of two-stage compression gives the new

portable an advantage in general service, particularly at high altitudes and in hot climates. Adoption of air-cooling eliminates the danger of freezing and keeps the size and weight of the assembly within reasonable limits.

Partly compressed air from the low-pressure cylinders passes through an intercooler. Cooling is effected by air drawn through the intercooler network by a fan. The intercooler efficiency is such that the air is discharged from it into the high-pressure cylinder at a temperature only a few degrees higher than the prevailing atmospheric temperature.

The temperature of the air at the compressor outlet is 200° cooler than that from the water-cooled, single stage machines. This insures cooler valves and cylinder walls, which is reflected in a long life and a low rate of decline in efficiency. It also simplifies lubrication problems and eliminates carbon.

A Waukesha four-cylinder gasoline engine of the heavy-duty type with patented "full-power" combustion chamber, designed expressly for this service, supplies the power.

New Line of Controllers for Synchronous Motors

All standard lines of General Electric synchronous motor control have been superseded by new lines incorporating new and important features. Included in this control equipment are relays for automatically applying and removing field excitation and for protecting the stator and amortisseur windings under all operating conditions.

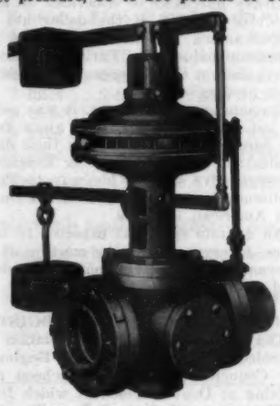
For automatically applying field excitation when the motor reaches a predetermined speed near synchronism, a new relay known as the slip-frequency field-application relay is provided. The coil of this relay is connected across a section of the field discharge resistor with a half-wave copper oxide rectifier in series with it.

During the starting period, induced field current of slip-frequency flows through the discharge resistor so that half-waves of slip-frequency current flow through the relay coil causing the relay to pick up and open its normally closed

contacts. This relay has a short time delay drop-out which holds the contacts open during the period of acceleration. When the motor reaches a predetermined speed near synchronism, the time interval between half-waves of current is sufficient to allow the relay to drop out and apply field. By a simple adjustment of the relay, its time setting can be varied so that it will apply field at any predetermined speed from 92 to 99 per cent of synchronous speed.

New Regulator for Medium Gas Pressure Is Introduced

A specially designed governor for the sensitive regulation of medium gas pressures without the use of pilot or auxiliary controls is now being made by the Chaplin-Fulton Co. of Pittsburgh, as a regular addition to its line. The new device is adapted for use where gas at high inlet pressure, 50 to 100 pounds or over,



needs to be reduced and kept constant at say 5 to 10 pounds in the distribution system.

Patterned after the duplex low pressure regulator made by the same company, this new device employs two diaphragms moving in opposite directions but exerting their power in the same direction, one being immediately connected to the valve stem, the other connected indirectly by a toggled lever which multiplies its force and reduces frictional resistance to a minimum. Such a method of operation results in great sensitiveness and power as compared with a governor using only a single diaphragm.

The Fulton duplex medium pressure regulator, as it is called, like all other Fulton regulators, may be equipped with V-port valves for operation under light loads. The V-port valve is effective for half the lift of the valves so that there is no restriction to the passage of the gas at peak loads.

Resistal B Is Designed to Meet Corrosive Conditions

Resistal B, put on the market by the Chemical Products Co., Wichita, Kans., is designed to meet severe corrosive conditions such as are encountered in oil production and refining. It resists the action of alkali up to 20 per cent concentration, is unattacked by sulphuric acid of accumulator strength, and is stable under nearly all conditions.

Further facts concerning it are presented as follows by the company: It is relatively nonimflammable, and is practically impermeable to water, having a hygroscopicity factor of 0.05. It is very flexible, and presents a tough film in one and one-half hours' drying time. It has a tensile film strength of 5,000 to 7,000 pounds per square inch, and exceedingly high dielectric resistance. This coating will not decompose at 180° C. Resistal B immersed for three months in 30 parts by volume (36 per cent) sulphuric acid is unaffected, and it remains unattacked upon indefinite immersion in caustic soda solutions. Coefficient of contraction, .0000025 per 1° C.; specific insulation resistance in air, infinity; after immersion in water for a long period, 50,000 ohms; breakdown voltage, 24-26 kv./cm.; specific inductive capacity, 2.4.

Among the Equipment Houses

The Republic Steel Corp. has closed its office in Dallas, Tex., and opened an office in the Gulf Building, Houston, Tex. The entire office personnel has been transferred from Dallas to Houston.

—

The Neilan Co., Ltd. (division of Mason Regulator Co.), manufacturer of automatic regulating and control equipment, has opened a new office in the Whitaker Building, Baltimore, Md., with O. H. Seal in charge.

—

The Mission Manufacturing Co. recently gave an oil man's party at the Tejas Club, on top of the Petroleum Building, Houston, Tex., the occasion being the introduction of the new Mission pump piston. The piston was on display and literature available. Entertainment features and refreshments were on the program.

—

The Seattle (Wash.) Gas Co. has contracted with the Semet-Solvay Engineering Corp., New York, for the installation of the Semet-Solvay ignition arch process for carbureting with heavy oil and for backruns in three of its 9-foot water gas machines. The work will involve a general rebuilding of the machines and some of the auxiliary equipment for handling gas.

—

The Dunbar Engineering Co. has appointed the Washington Engineering Co., 601 Thirteenth Street NW, Washington, D. C., under the management of P. N. Israel, as its representative for Edward valves in the district of Columbia.

—

S. H. Atkinson, assistant manager of the MacClatchie Manufacturing Co., Compton, Calif., is making a survey of the Texas, Oklahoma and Louisiana oil fields, introducing the new type MacClatchie pump piston.

Foxboro Bell Type Meter For Low Pressure Flows

The Foxboro Co. of Foxboro, Mass., has incorporated most of its well-known meter features in a new bell type meter for measuring the flow of gas or air at low pressures. One of the features of this new meter is its compactness. One meter can measure as much as 100,000 cubic feet per hour. In addition, should the flow conditions change and a meter of greater or less capacity be required, the same bell type meter can be adapted to the new conditions simply by installing an orifice plate of the correct size.

The bell type meter may be furnished with any of the standard primary devices, orifice plate, pitot tube, flow nozzle or venturi tube. This makes it available for use wherever low pressure loss is desirable. The instrument is built ruggedly and is not materially affected by vibration or changes in leveling.

Ranges of 2.5, 5, and 10 inches of water differential may be furnished. The meter may also be used in wide range meter settings with Foxboro meters of higher ranges. An interesting eight-page bulletin on this meter may be had by writing the Foxboro Co.

REMODELING ROD DEPARTMENT

The sucker rod department of the Oil Well Supply Co.'s Imperial works in Oil City, Pa., is to be remodeled and modernized, according to announcement of F. F. Murray, vice president. The gas-fired heat-treating furnace will be renewed and the arrangement of equipment in the steel sucker rod building will be changed to facilitate production. The work, which has been authorized by the parent company, the United States Steel Corp., is expected to require several months.

CONTRACTS FOR SOUTHWESTERN

Among contracts recently awarded the Southwestern Engineering Corp., Los Angeles, Calif., are one from the Triangle Refining Co., Venice, Calif., for two large high-pressure heat exchangers, and one from the Edington Oil & Refining Co., Signal Hill, Calif., for a 750-square-foot condenser. The heat exchangers for the Triangle, replacing an old one, are expected to cut fuel costs almost 50 per cent.

SNAP-ACTION CONTROL

Said to simplify installations and to create a wider market for MW automatic oil burning water heaters, important improvements, chief of which is a mechanical snap-action control, have been announced by the heater division of the Motor Wheel Corp., Lansing, Mich. The new type control eliminates need for electric current in the operation of these units, and also, since they employ an oil pilot, their operation is independent of the availability of gas.

Simmons Automatic Valve Has Distinctive Features

The Simmons automatic flowing valve, introduced by the Simmons Automatic Valve Co., Longview, Tex., is a two-way valve, which opens and closes by air or gas traveling in the same direction. The valve is placed in operation on a well by "making up" the valve, which is built into an 8 or 9-inch nipple, on a string of either 1 or 2-inch tubing, plugged at the bottom. This tubing is used as an air or gas line and is floated into the fluid flow line, which may be either 2½-inch tubing, 3-inch casing, when 1-inch air or gas line is used; or 4, 4½, 5-⅝ or 6-inch flow line if 2-inch air or gas or 2½-inch air or gas line is used.

The first or automatic valve is placed near the bottom of the air or gas line just above the plug at the bottom. In case of shallow production this is the only valve necessary, but in case of deep production or where wells fill up rapidly and where it is necessary to have frequent shutdowns, as in East Texas where proration rules prevent constant operation, more than one valve is necessary. To determine the space between the bottom valve and others above, the regular fluid level, the speed with which the fluid comes into the well and the amount of air or gas pressure available are all to be taken into consideration.

In addition it must be remembered that 100 pounds of air or gas pressure will lift approximately 245 feet of water or 301 feet of East Texas oil. Allowance must be made of about 50 pounds in order that sufficient pressure will be available to continue the load of fluid to the top after it has been started upward, by the first pressure turned under the fluid when the valve is tripped.

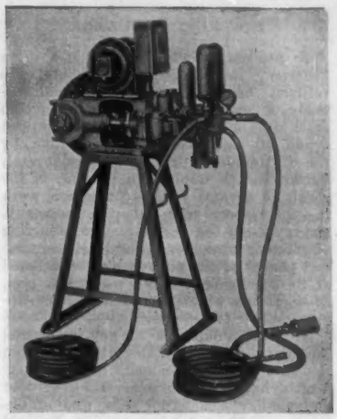
In case of two or three valves in the well, the fluid is lifted by stages by turning the air or gas into the line. This opens the top valve and the oil or fluid is lifted to the top of the well by the air or gas pressure. When the load is dumped a little more pressure is turned on and the top valve closes and the second valve opens. When the second load of oil or fluid is sent to the top with more pressure turned into the line the second valve closes. Both then remain closed and the third or bottom valve operates automatically.

In the event of a shutdown of the well and the release of all the air or gas in the line the top valves will come into play again when the well is started.

Two bulletins on angle compressors are being sent out by the Sullivan Machinery Co., 400 North Michigan Avenue, Chicago. An eight-page one is devoted to single-stage types, for gas and air, directly connected and belt-driven, and a four-page one to 8-inch stroke, direct-connected and belt-driven.

Line of Car Washer Units Announced by Worthington

The Worthington Pump & Machinery Corp., Harrison, N. J., is introducing a line of four complete car washer units. Designated as 1-gun standard, 1-gun de luxe, 1-gun super de luxe and 2-gun super de luxe, these units range in capacity from 4½ gallons to 12 gallons per minute. Each unit embodies a Worthington



Worthington 2-gun car washer unit

horizontal power pump with enclosed crankcase, similar in design to the Worthington power pumps widely used in industrial plants.

The pump is driven, through a silent chain, by an electric motor mounted above the pump frame. This construction produces a sturdy and compact unit. Bronze bevel-faced wing valves with bronze seats are an assurance against corrosion and sticking, while adjustable stuffing boxes give long life to shaft packing. The super de luxe models are equipped with a specially designed combination relief, check and unloading valve, which bypasses the water not required in partial-capacity service, thus reducing power consumption. Each 25-foot discharge hose is connected to a hydraulic gun with nitralloy orifice.

Pump, motor and other parts of the unit proper are painted a brilliant scarlet, while the high supporting stand is painted with aluminum.

Branch Factory Is Opened by Doheny Stone Drill Co.

Housing the sales and service departments representing Hydril equipment in the Gulf Coast and Mid-Continent territories, as well as being equipped to handle the manufacture of certain products in the Hydril line, the Doheny Stone Drill Co., has opened its branch factory at 4300 Calhoun Road, Houston, Tex.

Hydril tubular goods will be made in the factory. The line includes the internally and externally flush casing joint, externally flush drill pipe and the new external upset drill pipe. The company manufactures a compete series of hydraulic rotary machines, drawworks, portable drilling and well pulling machines; a heavy duty three-cylinder vertical steam engine particularly adapted to drilling service, well pumps, tubular goods and gas and pressure control apparatus as well as many specialties. S. S. Parker, field superintendent for Doheny Stone Drill Co. is in charge of the new establishment.

ANOTHER MACK PATENT

Patrick H. Mack of Bradford, Pa., for several decades connected with the Oil Well Supply Co. and known for his work in the invention and improvement of oil and gas well packers and other equipment, has been granted a patent on a flooding control valve. The patent has been assigned to the Oil Well Supply Co. for manufacture.

New Process Enables Refiners to Obtain Large Yields of Lubricating Stock and Asphalt

By C. O. WILLSON

A process which, through use of a "carrier" in fractionation, enables the refinery operator to secure simultaneously a maximum yield of heavy lub stock with a residual asphalt from topped crude oil has been made available by the Lummus Co. The new development, known as the Coubrough process, is the result of several years of research work in the laboratories of the company, specialists in the design and construction of refinery equipment. The final commercial phases of the process were completed at its development plant, which has been in operation at Bayonne, N. J., for approximately two years.

Although adaptable to any residuum, the new process has special merit from the standpoint of securing quality overhead cylinder stocks from Mid-Continent and similar base crude oils, and of obtaining in the same operation a residual oil suitable for utilization as asphalt material. Plant operators are familiar with the difficulty in securing suitable asphaltic material in a vacuum operation in which lubricating oil stocks are secured as overhead oils. In the case of Mid-Continent and other mixed base crude oils the bottoms usually are a flux of no value except as fuel.

Reason for Failure

The reason for the failure to obtain a more complete recovery of the heavy lub stocks in the ordinary vacuum distillation operation is due to the operating conditions. The boiling range of the heavier lub stocks is such that either a very high vacuum at the point of flash or a high furnace outlet temperature are necessary. The vacuum column of a two-stage unit, being designed to provide for fractionation of heavy gas oil and light, medium and heavy lub stocks, is of such construction that it is difficult to obtain a high vacuum at the point of flash, while the temperature necessary to insure vaporization of the heavier lubs under a moderate vacuum results in harmful cracking. When a two-column unit of usual design is employed for processing a crude of low asphalt content the recovery of the heavier fractions is a practical impossibility and it has been found more economical to run a residual lub stock, from which the asphalt is removed by treating. In addition to the losses of lub stock involved in the treating operation, the value of the asphalt is destroyed.

The Coubrough process effects the simultaneous recovery from a residuum of the heaviest lub stocks and low penetration asphalt. Operation of the process can be controlled to produce marketable asphalts of various grades direct from the unit, while the character of the heavy lub distillates which can be recovered indicates that the finished oils will be equal or superior to those obtainable from a residual stock.

Description of Process

Briefly described, the Coubrough process comprises blending the residuum containing lub stock and asphalt with additional asphalt and a light oil to produce a mixture of predetermined proportions. This added light material, designated as the "carrier," may be any available light distillate such as heavy naphtha, furnace oil or light gas oil. The mixture is pumped through a heating coil and flashed into a column where the "carrier" and heavy lub stock are recovered as distillates and asphalt of the desired specifications as residue. The gap between the boiling ranges of the light oil and the heavy lub stock is so great that they can be easily separated. The mechanism of flash vaporization is such that with a mixture of the character used, the vaporization of the "carrier" takes place throughout the entire body of the mixture and results in a marked lifting effect on the heavy oils. Adjustment of the blend and the heating operation makes the process so flexible that residues of various compositions may be readily handled.

Summary of Advantages

A summary of the advantages to be gained by the use of the Coubrough process includes:

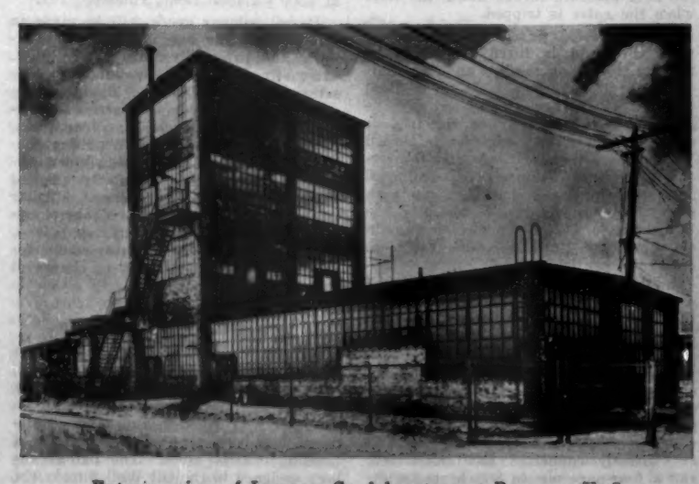
1. Maximum yield of heavy lub stock with simultaneous recovery of low penetration asphalt.
2. Light distillate used as "carrier" is readily available in any refinery and easily recoverable.
3. Temperatures are much lower than in any present process and possibly cracking of lub stock due to overheating is eliminated.
4. The process is applicable to any residuum and can be controlled to give any desired separation of heavy lub distillates and asphalt.

Development Laboratory

The accompany pictures show interior and exterior views of the Bayonne development laboratory of the Lummus Co., one of the most complete units of its kind to be found in the petroleum industry. The plant in addition to laboratory equipment for testing products including small units to carry on distilling and fractionating operations has large semi-commercial equipment with which all phases of commercial operation can be checked and duplicated.

The equipment includes small tubular heaters which have sufficient heating capacity to carry on a distillation operation at a rate up to 5 bbls. per hour. The equipment also includes a small steam plant. In the fractionation end, the units have towers which can be operated separatively or in series. As indicated in picture this fractionating equipment is designed so as to enable the technologist to conveniently check all phases of the operation. In the final development of the Coubrough process several hundred runs were made with crudes obtained from a number of domestic fields.

In the initial operation the crude oil is topped of its light fractions and prepared for vacuum distillation. In the vacuum operation lubricating oil distillates are taken overhead and the asphaltic material is obtained as a residual product. The temperatures, amount of vacuum and application of "carrier" will vary with the properties of the topped crude and the unit at Bayonne enables the designers to determine accurately just what will be required to take care of a particular operating problem. The several control features are sufficiently flexible to enable one unit to operate with a wide variety of stocks.



Exterior view of Lummus Co. laboratory at Bayonne, N. J.

Interior view of experimental refinery operated by the Lummus Co. at Bayonne, N. J., where new Coubrough process was developed. View shows series of towers with special control features to carry on all phases of experimental work on commercial basis

RUMANIANS DISTURBED

Heavy purchases of American oil as a result of the fall of the dollar are reported among persons interested in the petroleum industry in Paris as threatening to disrupt the European agreement to limit production.

Rumanian oil companies, it was pointed out, are likely to break away from the agreement which confines their daily production to 18,500 tons. A Rumanian representative was on his way to Paris to discuss the matter with English, Dutch and American interests.

No definite split was expected to take place, however, before the meeting of an international petroleum conference scheduled to begin June 26.

ROCKY MOUNTAIN GEOLOGISTS

The Rocky Mountain Association of Petroleum Geologists and the Engineering Council held a joint luncheon and meeting at Denver, Colo., at which Ross L. Heaton was the principal speaker. His subject was "Problems of Search for Future Oil Fields."

CLASSIFIED ADVERTISING

Classified Rates

The rates for Classified Advertisements are 35 cents a line for the first insertion and 25 cents a line for each additional insertion. The following table will enable you to figure the cost of your advertisement:

	1 time	2 times	3 times	4 times
3 lines ..	$1.05	$1.80	$2.55	$3.30
4 lines ..	1.40	2.40	3.40	4.40
5 lines ..	1.75	3.00	4.25	5.50
6 lines ..	2.10	3.60	5.10	6.60
7 lines ..	2.45	4.20	5.95	7.70
8 lines ..	2.80	4.80	6.80	8.80
9 lines ..	3.15	5.40	7.65	9.90
10 lines ..	3.50	6.00	8.50	11.00

For rates on Classified DISPLAY see opposite column.

Six words usually constitute a line.

Compute white space at the above rates.

Mail your Classified Advertisement to

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma.

For Sale—Equipment

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also, large stock of lathes, pipe machines, milling machines, etc. Send for our list. Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St. Cincinnati, Ohio.

18 — 55,000-BBL. TANKS
Located Burkburnett, Texas, strictly guaranteed, clean and ready for immediate delivery. Will sell one or more where located, or will move and re-erect on your grade at great saving. The newest tanks ever offered for sale. Wire, write or phone.
SONKEN-GALAMBA CORPORATION
64 N. Second St., Kansas City, Kansas

5 and 10-ton Holt CATERPILLAR TRACTORS
Located Illinois, Indiana, Kentucky, and Texas.
BARGAIN PRICES
SCULLY-JONES & COMPANY
19th and Rockwell Sts. Chicago, Ill.

Equipment Wanted

L. H. BADGER
532 Beacon Life Bldg. Tulsa, Okla.
Wanted 85 HP to 225 HP Gas and Diesel Engines

Situations Wanted

REFINERY superintendent, 12 years experience desires connection. Address Box F-650, The Oil and Gas Journal, Tulsa, Okla.

Help Wanted

SALESMAN to sell best Kansas oil royalties. Five acre units. Good commissions and interest in company. Tickner Investment Co., 408 Commonwealth Bldg., Pittsburgh, Pa.

Patent Attorneys

REGISTERED PATENT ATTORNEYS
United States and Canada
Before disclosing your invention to anyone, send for blank form, Evidence of Conception.
Bulletin "How to Establish Your Rights" and complete information free.
LANCASTER, ALLWINE & ROMMEL
Suite 418, 815-15th St., N.W.,
WASHINGTON, D. C.

Incorporations

CHARTERS—Delaware best, quickest, cheapest, most liberal. Free forms. Colonial Charter Co., Wilmington, Del.

Chemists

GINTER CHEMICAL LABORATORY
OIL - GAS - WATER
118 West Cameron
Tulsa

Royalties—Production

BETTER CLASS
MONTHLY INCOME ROYALTIES
W. E. Cook, Court Arcade, Tulsa, Okla.

ROYALTIES CAREFULLY SELECTED
Oklahoma — Kansas — Texas
G. D. TERRIEN
Philcade Building, Tulsa, Okla.

ROYALTY DEALERS — Pleased to submit the very best Royalties with a free booklet thoroughly covering Royalties. B. L. ABICHT, 600 Ritz Building, Tulsa, Okla.

ROYALTIES and Leases in Oklahoma and Logan Counties. Bargains for speculators. D. J. Perry, Edmond, Okla.

BIG LIST—Producing Royalties, cheap Leases—Royalty spreads in all active fields. Harry Haynes, Grantville, Kans.

JAMES B. McANALLY
Hunt Building, Tulsa, Oklahoma
An organization backed by twenty years' practical oil experience, supplying well selected royalties to dealers only, who are interested in building satisfied clienteles.

ROYALTY OWNERS
Present low oil prices are most favorable for royalty investments. Our twenty years' oil experience assures you of careful and intelligent selection.
Weekly oil report sent free on request.
G. A. SIMON
Exchange Bank Building. Tulsa, Okla.

ROYALTIES
Kansas—Oklahoma—Texas
References all Banks
TULSA, OKLAHOMA
217 Cole Building
L. H. Witwer

PRODUCING OIL ROYALTIES in Fractional deeds from $100 up.
John L. Dickson, Box 1113, Tulsa, Okla.

LOANS MADE ON ROYALTIES OF MERIT
Will purchase—sell—or trade.
Send me your offerings or write for mine, stating your requirements.
FREDERICK A. SANSOME
Box 441 Greenwich, Conn.

INVEST your savings in Producing Oil Royalty; I am selling 1/128 Deeded Royalty Interests under Producing Wells at $75.00 each. Address Guy J. Stumpff, Box 1478, Kilgore, Tex.

SELECTING OIL ROYALTIES for dealers a specialty.
Kansas-Oklahoma City-Seminole.
Chester Imes,
First National Bank Building,
Oklahoma City, Okla.

Royalties—Production

ROYALTIES FOR INVESTMENT
Andrew J. Barrett,
Suite 1903, The Philtower,
Tulsa, Okla.

ROYALTY DEALERS
BE SAFE! — Get an unbiased report on royalties before buying—ask about our service.
ROYALTY ENGINEERS, INC.
Philcade Building, Tulsa, Okla.

PRODUCING OIL ROYALTIES
Bought and Sold.
Inquiries invited from Oil Companies, Bankers, Dealers.
DAVID R. MITCHELL & CO.,
Established 1916.
20 BROAD ST. NEW YORK.

ATTRACTIVE royalties Webb county; Leases, drilling areas priced right. W. J. Dobbs, 915 Tower Pet. Bldg., Dallas, Tex.

ROYALTIES for dealers, producing, nonproducing Oklahoma, Kansas, Texas, Louisiana. Lowest prices and highest quality. James R. Haynes, Grantville, Kans.

HIGH GRADE producing oil and gas royalties offered to dealers. Billie Smallwood. P. O. Box 2261, Tulsa, Okla.

Leases—Production

NEW MEXICO Oil Leases, Lands & Royalties. Send 30c in stamps for new up to date map of New Mexico showing oil fields, counties, townships, etc. Size 18x20.
Roy G. Barton, Clovis, New Mex.

FOR SALE—Oil and gas leases in proven territory and producing property in the Kentucky shallow oil field. Address W. P. Harley, Bowling Green, Ky.

HAVE six thousand acres oil and gas Leases in Eastern Ky, field; 25 cents rental yearly, due in six months. One-eighth oil and gas royalty. Largest gas companies planning to develop adjoining acreage. Price $1.00 per acre or will drill on fair basis. Address, Lock Box 305, Owensboro, Ky.

KENTUCKY oil leases with shallow production proven. Have over 2,000 acres in best area and want deep test well in exchange for liberal division of assured production and leases. Address Box F-640, The Oil and aGs Journal, Tulsa, Okla.

A NEW DEAL
The next GREAT OIL FIELD will be in FLORIDA. If you want to get in on the ground floor, on the best and most promising wildcat proposition you have ever seen, and for a very little money, I invite you to get in touch with me. This goes for you, if you are a drilling contractor, supply man, promoter, operator, or dealer in leases. Address: Lloyd S. Malone, 2507 Watrous Avenue, Tampa, Fla. Phone H-44-063. References furnished and requested.

STARTING 1,500 ft. hole shortly, semi-proven territory expect make 500 barrel well. If interested ground floor chance 20 for 1, write, E. Croft, Proctor, Texas.

HAVE 50,000 acres oil and gas leases in Oregon. Estimated drilling depth 3,000 feet. Oil indications established. Good market for gas. Capital needed. Act quick. F. Tickner, 408 Commonwealth Bldg., Pittsburgh, Pa.

FOR SALE OR LEASING—Land in Muskegon, Michigan with strong oil and gas possibilities on which an incompleted well stands. Address J. Valek, 1901 S. Cicero Avenue, Cicero, Illinois.

FOR SALE—77,000 acres Fee Lands in Newton and Jasper Counties, Texas, and Calcasieu Parish, Louisiana; well blocked; active oil leasing area; price reasonable. J. S. Edwards, San Jacinto Life Bldg., Beaumont, Texas.

Leases—Production

ONE HUNDRED barrel Ohio oil production. Pennsylvania grade. Will accept best offer. F. Tickner, Commonwealth Bldg., Pittsburgh, Pa.

OIL AND OIL POOLS LOCATED.—A new scientific method of locating oil. Locations guaranteed. Cash or percentage basis. Address, Box 224, Aurora, Mo.

Financing

BONDS THAT SAFEGUARD Investors solve your problem of raising capital for new industries. Write for literature.
Bankers Interstate Security Co.,
Electric Bldg., Denver, Colo.

JOHN MORRIS 7th Floor, 1237 Market St., Philadelphia, Pa., invites full facts first letter from capable parties planning negotiations of reasonable capital support for undertakings distinctly of higher order. Use registered mail, safeguard data.

INQUIRIES solicited — Corporations desiring capital through securities issue.
BROOKWORTH,
110 East 42d St., New York City.

JAMES E. MILLER CO., 207½ E. Third St., Tulsa, Okla., will co-operate with responsible parties seeking aid in financing projects of higher order.

FINANCING
Corporations requiring capital for promotion or expansion are invited to communicate with the undersigned.
WILLIAM R. THURSTON
33 West 42nd Street New York, N. Y.

Established organization with record of successful accomplishment offers immediate action in financing of sound projects.
HENRY W. BENSON ASSOCIATES
92 Liberty Street New York, N. Y.

Business Opportunities

CAPITAL — Experienced dependable broker will aid in financing projects of merit. Amster Leonard, East Orange, New Jersey.

OWNER offers unencumbered mining property near Yellowstone Park. Smelter, mines, power plant, etc. Too big for owner to operate. Fred Holliday, Billings, Montana.

HAVE three million yards of 50c gold bearing gravel. Need $7,000.00 cash to operate at 1,500 yards per day capacity. If interested answer at once. P. E. Dunn, Bristol Hotel, Boise, Idaho.

DRILLING contractor needs capital to complete gas well near Seneca Falls, N. Y. 3,000 acres. Gas sales assured. Good interest in return. F. Tickner, Commonwealth Bldg., Pittsburgh, Pa.

GOLD MINE of great magnitude and merit. 200,000 tons gold bearing quartz in sight. 50,000 tons developed ore. Ready for mill. Outstanding opportunity for investors and or responsible broker. Address Engineer, Box 182, Hot Springs, New Mexico.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

Display Rates

The rate for Classified Display Advertising set in similar style to this Ad or in two-Column style is as follows for each insertion:

1 inch	1 time	$5.00
1 inch	13 times	4.50
1 inch	26 times	4.00
1 inch	52 times	3.50

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma.

GUMBO BUSTER ROTARY
$17,500.00
CONROE, TEXAS

DESCRIPTION:

BOILERS—(3)—110 h.p., 250 lb. W.P. Broderick, Super-Heated Boilers with stacks and miscellaneous fittings.

BOILER FEED PUMPS—(2)—6x4x6 in. Gardner-Denver, Duplex, Overhauled, Boiler Feed Pumps.

ENGINE—12x12 Johnson Gumbo Buster, Twin Cylinder, Rotary Drilling Engine on Steel Skids and with Chain Guards.

ENGINE FOUNDATION—All Steel, Heavy, Re-inforced I-Beam Engine Foundation.

MUD PUMPS—(2)—14½x7¼x18½ Johnson Gumbo Buster Slush Pumps on Steel Skids.

ROTARY TABLE—26 in. Johnson Gumbo Buster, Latest Type, Fully Enclosed, Oil Bath, Rotary Table on Steel Skids, with Master Bushings and either 6 in. or 4 in. Drive Bushings.

DRAW WORKS—Johnson, Extra Heavy Vertical Type, with Steel Jack Posts; Steel Guards and Braces; 8 in. Drum Shaft; Steel Header Boards Sullivan Brake Compounders; Hill and Foster Automatic-Cathead; Rotary Chain; Turnbuckles, Fittings and Wire Line Spooler.

KELLYS—6 in. x 38 ft. New Lucey Grief Stem with Used Couplings; or 4½ in. x 36 ft. Used Grief Stem with Couplings.

SWIVEL—8 in. Johnson Gumbo Buster, Latest Type Swivel with lower connections.

HOOK—8 in. Ideal Spring Swivel Wigle Hook, Enclosed Type, with Safety Latch.

TRAVELING BLOCK—66 in. 4-Sheave, Union Tool Roller Bearing Traveling Block with Guards.

CROWN BLOCK—5-in-line Johnson Gumbo Buster, Heavy Duty Roller Bearing Crown Block with Catline Sheave.

WEIGHT INDICATOR—Martin-Decker Weight Indicator with practically new diaphragm.

GENERATOR—3 K.W. Type 6-A, Overhauled Moon Generator.

ELEVATORS—6 in. B. J. Wilson, Center Latch, Double Extra Heavy Elevator, or 4½ in. B.J. Wilson, Center Latch, Extra Heavy Rotary Elevator.

TONGS—10 in. XX Dunn Rotary Tongs with 6⅝ in. Bushings.
Or 5 in. B.J. Wilson Rotary Tongs.
4½ in. B.J. Wilson Rotary Tong Head.
3½ in. B.J. Wilson Rotary Tong Head.

ROTARY SLIPS—6⅝ in. x 14 in. Oil Well Imperial Rotary Slips, or 4x14, Type 27, WKM Rotary Slips.

ELEVATOR LINKS—2¾x72 in. B.J. Weldless Elevator Links.

ROTARY LINE—Used 1⅛ in. x 1250 ft. American, Manilla Center Rotary Line.

ROTARY HOSE—New 2½ in. Bridgeport Rotary Hose with Boss Couplings, or New 3 in. x 45 ft. Wicapee Rotary Hose with Wiggins Couplings.

DRILL COLLARS—6 in. x 6 ft. American Drill Collar, or 4½ in. x 6 ft. Hughes Drill Collar, each.

MISCELLANEOUS—(2)—Home made steam lubricators; 3 in. Brauer Manifold Valve, 3 in. Brauer Release Valve; 1½ in. Catline; 6⅝ in. Brauer Circulating Head; (2) 6 in. Short Rock Bit Starting Collars; Eureka Drill Pipe Rack; 3 in. Standpipe with Gooseneck; Rock Bit Wrench, etc.

Selling price, F. O. B. Conroe, Texas, for the complete Rotary, as listed, with tools for either 6 in. Drill Pipe or 4½ in. Drill Pipe.....$17,500.00

Can furnish string of 6⅝ in. 25.20 lb. Drill Pipe with Tool Joints, thoroughly shopped, or 4½ in. 16.60 lb. Drill Pipe with Hughes A.P.I. Tool Joints, at attractive prices. Complete information regarding condition, price and all facts pertaining to drill pipe will be furnished on request.

Other equipment, not listed here, may be substituted, so that a Rotary may be assembled in several different ways to suit the needs of the user. For more complete information—

Write, Phone or Wire—Collect—either of the following:

BRIDGEPORT MACHINE COMPANY
MANUFACTURERS DISTRIBUTORS
OIL DRILLING-FISHING AND PRODUCTION EQUIPMENT

Branch Stores in the Active Oil Fields

GENERAL OFFICE:
Wichita, Kansas
Tel: L. D. 59 or 2-1431

ROBERT HORTON
Houston Representative
Tel. Lehigh 0200

JOHN WESTON
Local Conroe Manager
Tel. Atchisonville 19

Index to Advertisers

A
Air Reduction Sales Co.
Allsteel Products Mfg. Co.
American Meter Co. 2
American Radiator Co.
American Steel & Wire Co.

B
Baker Oil Tools, Inc.
Barnsdall Refineries, Inc.
Baroid Sales Co.
Barret, William M., Inc.
Barrett Co., The
Bethlehem Steel Co.
Big Lake Oil Co.
Bradford Motor Works, Inc. 81
Bridgeport Machine Co. 96
Bristol Co., The
Brown Instrument Co.
Byron Jackson Co.

C
Cameron Iron Works
Chain Belt Co.
Chaplin-Fulton Mfg. Co., The 78
Chapman Valve Mfg. Co., The
Chicago Bridge & Iron Works
Cities Service Oil Co.
Classified Advertising 95
Continental Can Co., Inc.
Continental Oil Co.
Continental Supply Co., The
Crane Co. 87

D
Darling Valve & Mfg. Co.
Dart, E. M., Mfg. Co.
Davis Regulator Co. 79
Dearborn Chemical Co.
De La Vergne Engine Co.
Devine, J. P., Mfg. Co., Inc. 83
Doheny Stone Drill Co.
Dowell Incorporated
Dresser, S. R., Mfg. Co. 21

E
Eagle-Picher Lead Co.
Emsco Derrick & Equipment Co.
Ethyl Gasoline Corp.

F
Fisher Governor Co.
Flexible Steel Lacing Co.
Foster Wheeler Corp.
Inside Back Cover
Foxboro Co., Inc., The

G
Gaso Pump & Burner Mfg. Co.
Gasoline Products Co., The 17
General Electric Co.
Gott, H. P., Mfg. Co., Inc. 83
Grant Oil Tool Co. 4
Graver Tank & Mfg. Corp.
Greenspon's Son Pipe Corp., Jos.
Guiberson Corp. 59
Gulf Refining Co.

H
Halliburton Oil Well Cementing Co.
Harrisburg Pipe & Pipe Bending Co.
Hazard Wire Rope Co.
Heeter, C. M., Sons & Co. 83
Hercules Tool Co.
Hope Engineering Co. 84
Hughes Tool Co. Back Cover
Humble Oil & Refining Co. 78

I
Illinois Steel Co.
International Harvester Co. of America
International-Stacy Corp.

J
Jarecki Mfg. Co. 55
Jenkins Bros.
Jerguson Gage & Valve Co.
Jones & Laughlin Steel Corp.

K
Kellogg, M. W., Co., The
Kennedy Valve Mfg. Co., The
Kibele Manufacturing Co.
Kinley, M. M., Co. 82

L
Landis Machine Co., Inc.
Layne & Bowler Co.
Ludlow Valve Mfg. Co., The 79

L
Lummus Co., The 46-47
Lunkenheimer Co., The

Mc
McIntosh & Seymour Corp.
McKee, Arthur G., & Co.

M
Macwhyte Co.
Magnolia Petroleum Co.
Maloney Tank Mfg. Co.
Marmon Herrington Co., Inc.
Mason Regulator Co.
Mepham & Co., Geo. S.
Inside Front Cover
Miller Sand Pump Co.
Mission Mfg. Co.
Moloney Electric Co.
Moore, Lee C., & Co., The
Motor To Chicago National Campaign 34-35-36-37

N
National Bank of Tulsa
National Lead Co.
National Supply Companies 19
National Transit Pump & Machine Co.
National Tube Co.
Neilan Co., Ltd.
Norris, W. C. 41
Norvell-Wilder Supply Co.

O
Oil Conservation Engineering Co. 82
Oil Center Tool Co., Inc.
Oil Well Supply Co.
Oklahoma Power & Water Co. 79

P
Parkersburg Rig & Reel Co., The
Petroleum Rectifying Co.
Pittsburgh Steel Co. 88
Petroleum Electric Power Club.
Pure Oil Co., The

R
Reading Iron Co.
Reading-Pratt & Cady Co., Inc.
Reid, Joseph Gas Engine Co.
Republic Steel Corp.
Robinson Orifice Fitting Co.
Roebling's, John A., Sons Co.
Ross, Dewey T.
Ross Heater & Mfg. Co.

S
Separafine Mfg. Co.
Shell Union Oil Corp. 77
Smooth-On Mfg. Co. 81
South Chester Tube Co.
Spengler Tool Co.
Sperry-Sun Well Surveying Co. 82
Struthers Wells-Titusville Corp.

T
Taylor Forge & Pipe Co.
Taylor Instrument Companies
Thermoid Rubber Co., The
Timken Roller Bearing Co.
Front Cover
Timken Steel & Tube Co.
Titusville Iron Works Co., The
Tretolite Co.
Tube Turns, Inc.
Tulsa Camera Record Co. 82

U
Union Wire Rope Co.
Universal Oil Products Co. 15

V
Vellumoid Co., The
Vogt, Henry, Machine Co. 51

W
Walworth Co. 1
Warren Petroleum Co.
Water Mining Corp., The
Westinghouse Electric & Mfg. Co.
Wickwire Spencer Steel Co. 91
Williams, C. K., Co. of Calif., Ltd.
Inside Front Cover
Williamsport Wire Rope Co.
Winkler-Koch Engineering Co., The
W-K-M Co., Inc.
Worthington Pump & Machinery Corp.
Wyatt Metal & Boiler Works

Y
Youngstown Sheet & Tube Co., The